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The Federal Reserve Wire Transfer Network

Under the Federal Reserve Act of 1913, the Federal Reserve Banks play several major roles in the operation of the nation's payments mechanism. These roles include such familiar activities as the clearing and collection of checks and supplying the economy with currency and coin. A less widely familiar service of the Federal Reserve, but one that dwarfs all the others in the dollar magnitudes involved, is the operation of Fedwire--an electronic funds and securities transfer network which links the twelve Federal Reserve Banks and their branch offices with almost 10,000 commercial banks and other depository institutions nationwide, and which handles daily average transfers of funds and securities now exceeding one trillion dollars in value.

Fedwire is a "wholesale" wire transfer system, used principally for the transfer of funds and securities in large-dollar amounts between depository institutions and their major corporate customers.[1] For instance, in 1988 the average funds transfer on Fedwire was over $2.9 million in size, and the average securities transfer was about $9 million. To put these numbers in perspective, the average check size is about $900.

Fedwire is one of two large-dollar electronic payment systems that serve the nation's domestic and international financial business. Fedwire is principally domestic in orientation, while foreign-related dollar payments primarily flow through the Clearing House Interbank Payments System (CHIPS). CHIPS is an electronic system for transferring dollar balances only. It is privately owned and operated by the New York Clearing House Association, and closely rivals Fedwire in terms of dollar volume and importance to the nation's financial

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[1] There are, however, no restrictions on the minimum dollar size of money transfers over Fedwire, and individuals and small business can and do use Fedwire for transferring funds when the need for immediate and assured transfers of funds justifies the cost.

business. In recent months CHIPS has been handling over $650 billion per day in funds transfers, with an average payment size of about $5 million that is even larger than the average for Fedwire. However, because CHIPS and Fedwire serve essentially two different payments functions, there is little overlap between them, and that fact, as well as other differences, makes it appropriate to discuss them separately. Accordingly, this paper focuses only on Fedwire, though the reader should keep in mind that many of the larger depository institutions have the capability to send and receive funds over both Fedwire and CHIPS, and that they can and do shift between the two systems as need or circumstances warrant.

The following discusses the evolution of Fedwire and the current capabilities of its two principal operational features--the electronic transfer of funds only and the electronic transfer of securities against payment. Also addressed are some of the major policy concerns that have arisen in recent years as the growing number and dollar volume of funds and securities transactions have raised the risks to both the Federal Reserve and the users of the Fedwire system.

The Evolution of Fedwire in Brief

The evolution of Fedwire began over 70 years ago, with the initial opening of the Federal Reserve Banks on Monday, November 16, 1914. At that point in the nation's history, adjustments to bank balances and the movement of funds from a member commercial bank's reserve account with its Reserve Bank on the east coast of the United States to a reserve account of a member bank on the west coast, or any point in between, often required the Reserve Banks physically to ship currency or gold. This procedure was costly, required considerable time and involved heavy risk. The only available alternative was to use the public telegraph facilities of Western Union Telegraph Co. or Postal Telegraph Co. to instruct the

Reserve Banks to make accounting transfers of funds between banks. However, because these transmission facilities were not under the control of the Federal Reserve, such alternatives also had their risks and operational drawbacks, and were used only occasionally.

In 1918, taking advantage of the latest technology then available, the Federal Reserve introduced its first dedicated funds transfer network in the form of a Morse Code system using leased wires for greater security. That first network connected only the 12 Reserve Banks, the Board of Governors and the Treasury. The Federal Reserve Bank of Chicago served as the "switching center," relaying messages between points in the East and the West. From the beginning, use of the system grew rapidly; at the New York Reserve Bank activity ranged from 75 to 100 messages daily in the first year of operation and averaged more than 600 messages daily ten years later.

As technology continued to advance, the Federal Reserve decided in 1937 to convert the Morse Code network into one using more "modern" equipment, such as teletype machines, which eliminated many manual operations in switching messages. Then, in 1940, further advances were made when the Federal Reserve installed a Western Union semi-automatic message switching system, with Washington D.C. and the Chicago Reserve Bank serving as the main switching center sites for the country.

By 1950, with the prosperous economy pushing funds transfer activity to ever higher levels, the Federal Reserve considered itself vulnerable in two areas: (1) given the possibilities of war, Washington, D.C. was no longer considered a preferred site for a switching center, and (2) the existing network--a mixture of American Telephone and Telegraph and Western Union equipment--lacked integration. Recognizing these flaws, in 1953 the Federal Reserve replaced the existing teletype network with a virtually automatic message system using AT&T equipment exclusively. It also eliminated the Chicago switching center and moved the Washington, D.C. switch to the Richmond Federal Reserve Bank.

The advancing nuclear and computer ages together led to the next phase in Fedwire's evolution. In 1967 development began on a new message switching center in Culpeper, Virginia, whose out-of-the-way location and structural design (built into the side of a mountain) acknowledged the nuclear threat. At the same time, the existing Fedwire communications and transactions processing systems were replaced with state-of-the-art, computerized high-speed electronic telecommunications and processing systems. The Culpeper-based network was put into operation in 1970. In that year, Fedwire processed 4.3 million funds transfers totalling $7.2 trillion in value.

Also in 1967, the Treasury and the Federal Reserve Banks, as fiscal agents of the Treasury, jointly initiated a system for issuing and maintaining marketable Treasury securities in book-entry form. The book-entry system enables ownership records for eligible securities to be maintained and transferred as accounting entries on computer files at Federal Reserve Banks, thereby eliminating physical securities, which are susceptible to theft or loss, from existence. The design and development work on the book-entry securities system had actually begun in 1963, but several years were required to solve the formidable operational complexities and legal problems involved in the implementation of such an innovative and far-reaching change in the Government securities market.

Although the book-entry system evolved primarily during the late sixties and early seventies, its genesis can be traced to 1921, when the Treasury first permitted telegraphic transfers of its securities. These telegraphic transfers, which eliminated the exposure, expense and delay of mailing securities long distances, came to be known as "CPD Transfers" because, initially, the Commissioner of the Public Debt had to approve each one. However, this procedure proved to be awkward and inefficient. A seller had to deliver a definitive bearer security to one of the 12 Federal Reserve Banks (or one of the 25 branches), which would then retire the seller's physical certificate and wire an order to the buyer's Reserve Bank to issue an

identical physical security to the buyer. Thus, each CPD transfer still required movements of paper securities to and from Federal Reserve offices, as well as significant printing and engraving costs.

In 1965, in an interim step to improve the efficiency and reduce the risk of the physical securities transfer process while the book-entry system was still in the developmental stage, the Treasury and the Federal Reserve Bank of New York implemented the Government Securities Clearing Arrangement to clear trades among banks and securities dealers in New York City with minimum movement of physical securities. The arrangement permitted telegraphic transfers of securities to take place among participants during the day, with each participant then settling its net city-wide position at the end of the day through one delivery of physical securities to or from the Federal Reserve Bank of New York.

From its inception in 1967, the book-entry system grew rapidly in coverage and scope. Over the ensuing ten years, Treasury regulations were amended from time to time to make an increasing percentage of outstanding Treasury securities eligible for book-entry, and several Federal agencies as well began issuing their securities in book-entry form. By 1977, the successful conversion to book-entry of the bulk of outstanding physical Government securities, and their eligibility for electronic transfer by wire, had largely eliminated the need for settling transactions in physical securities. Accordingly, the end-of-day physical settlement through the Government Securities Clearing Arrangement became unnecessary and was eliminated that year.

As funds and book-entry securities volume increased steadily throughout the 1970s, the need for an alternative to the centralized message switching concept became apparent. As a result, in 1982 the Federal Reserve began implementation of an improved electronic communications network called the Federal Reserve Communications System for the 80's (FRCS-80). Unlike the previous system, where all messages between Federal Reserve

Banks had to go first through Culpeper as a switching center, messages on the new system are sent by the most direct route, using multiple lines within the network. Consequently, messages arrive faster and, since multiple paths are available, a breakdown in one part of FRCS-80 is less disruptive than was a breakdown in the centralized Culpeper system.[2]

While Fedwire in its current configuration is a highly sophisticated computer-based system designed for the rapid and secure electronic movement of enormous amounts of money and securities from and to accounts on the books of Reserve Banks, stripped to its essentials Fedwire is quite simple in concept. Fedwire consists of three basic components:

1. A high-speed communications network (FRCS-80) electronically linking all Federal Reserve Banks and their branches;

2. A computerized processing and recordkeeping capability at each Reserve Bank to process and account for individual funds and securities transfers as they occur, and

3. Local Federal Reserve District electronic networks linking depository institutions in each District to their respective Federal Reserve Banks.

The local networks which link depository institutions to their respective Federal Reserve Banks reflect the high level of automation that also exists at most depository institutions using Fedwire. Nearly 99 percent of all securities and funds transfers processed over Fedwire are entered by depository institutions "on-line". That is, transactions are entered directly into the Fedwire system by the institutions sending funds or securities, without the necessity for any intermediate processing by the Reserve Banks. These on-line transactions are entered via one of three types of connections: dial-up terminals using ordinary telephone line connections; leased line terminals, or computer-to-computer interfaces. Instructions for funds or securities

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[2] As discussed later, the Culpeper site is now being used as a contingency Fedwire operations center to serve as a back-up should a Reserve Bank suffer an extended outage of its own Fedwire facilities.

transfers thus go directly from the sender's terminal or computer interface to the Reserve Bank's computer for processing, and then are sent automatically to the receiver's terminal or computer.

"Off-line" transactions, by contrast, require manual processing by Reserve Bank personnel. Off-line access by a depository institution is typically accomplished by means of a telephone request, done under special arrangements with the requestor's Reserve Bank, that must be authenticated at the time the request is made by codes or other procedures established by the Reserve Bank. All such telephone requests are tape recorded. Following receipt of an authenticated off-line transfer request, the transaction is entered into the Reserve Bank's computer by Reserve Bank personnel.

As the foregoing discussion suggests, Fedwire is a payments mechanism that has been evolving rapidly over the years in response to the nation's growing needs and technological capabilities. And that continues to be the case not just for Fedwire but also for the Federal Reserve's book-entry securities system. While both current capabilities have been in place for close to seven years, the Federal Reserve is already actively planning changes to enhance the quality and reliability of these services and to better serve the expanding needs of its users in the decade of the 90's.

With respect to the existing Fedwire system, the prime focus of the Federal Reserve at the present time is on improving the security and operational reliability of the network. While Fedwire is already a secure operation by most standards, the Federal Reserve is nonetheless undertaking two major additional steps to guard against fraudulent or unauthorized use. The first, involving encryption of all communications flowing through on-line connections with Fedwire, began in 1984 and was completed by the end of 1987. The second step, is a proposed message authentication procedure to ensure that messages originated by any participant on Fedwire are valid and are received at their ultimate destination without error or alteration.

The second current concern--the operational reliability of the Fedwire network--is being addressed on several fronts. While Fedwire presently incorporates much in the way of protection against service outages, through such means as redundant computer and telecommunications hardware and software at the individual Reserve Banks, and multiple communications paths between Reserve Banks, temporary outages in the availability of local parts of the Fedwire system have remained a chronic and unacceptable problem. Given the enormous dollar value and the time-critical nature of the funds and securities transfers that go through Fedwire daily, even such temporary outages in local segments of the system pose significant economic and financial risks to all concerned, and a prolonged outage would be entirely unacceptable. Accordingly, the Federal Reserve has begun to evaluate and implement means of improving Fedwire's nationwide operating reliability, and has developed contingency plans to handle a prolonged local outage, should one occur. A Contingency Processing Center, established at Culpeper, Virginia, has been equipped to serve as a back-up Fedwire operating center for Reserve Banks, other than New York, Chicago and San Francisco, to relocate their Fedwire operations in a day or so in the event of a prolonged outage of any of those Reserve Banks' Fedwire facilities. The Federal Reserve Bank of New York, because of its location in the nation's central money market, and its role as the operating arm of the Federal Reserve in the conduct of domestic monetary policy and international financial operations, has established its own contingency operating site within the Second Federal Reserve District, which is designed to permit a resumption of Fedwire operations within a few hours following any loss of the Bank's on-site capabilities. The seventh and twelfth reserve districts banks are following New York's example by establishing contingency sites within their own respective districts to support demands for rapid recovery.

In addition to these efforts to improve the safety, soundness and operational reliability of their Fedwire services, the Reserve Banks are also working closely with the

depository institutions that are the major users of Fedwire services to encourage and assist them in improving the reliability of their own operations. The outage of a major money center bank, leading to its inability to either send or receive traffic over Fedwire can, of course, also be enormously disruptive to the efficient operations of the nation's economic and financial system, as well as posing risk and operational burdens to all other participants in Fedwire.

The Fedwire Funds Transfer System

As suggested earlier, the Fedwire network has two distinguishable applications--one for the electronic transfer of funds alone and one for the electronic transfer of book-entry securities either free or against specified payment. This section describes the funds-only transfer system.

The Fedwire funds transfer system is a credit transfer system. That is, funds are sent through Fedwire only upon the request of the depository institution that is the sender of funds. The sender in making the request irrevocably authorizes its Reserve Bank to debit (charge) its account for the amount of the funds to be transferred and further authorizes the receiving depository institution's Reserve Bank to credit (pay) the same amount to the receiving institution. The receiving institution, by maintaining an account with a Reserve Bank, authorizes the Reserve Bank to credit the amount to its account, and further agrees that if the funds are designated as payable to a third party beneficiary, the beneficiary's account at the receiving depository institution will be credited promptly or the funds otherwise made immediately available to the beneficiary.

With a few exceptions, any institution that maintains a funds account on the books of a Federal Reserve Bank may routinely use Fedwire to make and receive funds payments, subject to terms and conditions established by the Federal Reserve. At present, there are now

almost 12,000 depository institutions with funds accounts at Reserve Banks, more than double the number a decade ago, and about 10,000 actively use those accounts to make funds transfers. This recent expansion of accounts largely reflects passage of the International Banking Act of 1978 and the Monetary Control Act of 1980. Prior to those two Acts, eligibility to maintain funds accounts at Reserve Banks was largely limited to member banks of the Federal Reserve System, Agreement and Edge corporations established under Sections 25 and 25(a) of the Federal Reserve Act, the U.S. Treasury, Federal agencies and Government-sponsored enterprises, official international financial organizations such as the International Monetary Fund, and a number of foreign central banks and governments. The International Banking Act of 1978 added U.S. branches and agencies of foreign banks to the list of eligible account holders, and the Monetary Control Act of 1980 added most nonmember commercial banks, savings and loan associations, savings banks and credit unions. At the same time, all of these added institutions were given access to the full array of Federal Reserve payment services, including those provided by Fedwire.

A transfer of funds over Fedwire is deemed finally and irrevocably paid by the Federal Reserve when the receiving depository institution receives the payment message or is given or sent an advice of credit to its account by its Reserve Bank, whichever occurs first. For most transfers involving on-line depository institutions the elapsed time from the sending of a funds transfer to the receipt of finally paid and available funds by the receiving institutions is a matter of seconds, or minutes at most. What this means in practical terms is that a funds transfer over Fedwire, once completed, is backed by the full credit of the Federal Reserve System and is thus the functional equivalent of the immediate payment and receipt of cash.

The legal framework for Fedwire funds transfers is set forth in Subpart B of Regulation J ("Collection of Checks and other Items and Wire Transfers of Funds"), issued by the Board of Governors of the Federal Reserve System. The regulation governs the handling

by Reserve Banks of funds transfer requests and provides rules for funds transfers over Fedwire. Additionally, each Reserve Bank issues an operating circular that is in the nature of an agreement governing the details of its funds transfer operations and other matters the Reserve Bank deems appropriate. Regulation J further provides that both Subpart B of the Regulation and the Reserve Bank's operating circulars issued pursuant thereto are binding on transferor and transferee depository institutions, beneficiaries, and other interested parties.

The "instant finality" feature of Fedwire funds transfers--immediate and irrevocable settlement of payments on a transaction-by-transaction basis--sets Fedwire apart from alternative means of making and receiving large-dollar payments. As noted, the only close equivalent in terms of certainty is payment in legal tender currency and coin, but even that alternative becomes, for obvious reasons, much inferior when making or receiving large payments in thousands or millions of dollars. Payments by conventional check are, of course, an efficient alternative means of making and receiving large-dollar payments, but a payment by check is provisional and the holder of a check payment faces the risk that the payment will be rescinded if the check is returned because of insufficient funds in the drawer's checking account, payment on the check is stopped, or failure of the payor's bank.

Payments over private-sector wire transfer networks are also efficient but similarly provisional. Unlike Fedwire, which uses participants' cash balances on the books of Reserve Banks to immediately and irrevocably debit and credit funds transfers, private-sector wire systems, which do not have access to their participants' funds accounts, operate on a net settlement basis. While individual payments messages are exchanged between participating banks throughout the business day, the actual transfers of funds between banks do not take place until the private wire system "settles," with those participants owing funds paying their net "due to" amounts into the system and those with net "due from" positions receiving those amounts. Thus, in the absence of some form of settlement guarantee, the inability of any

participant institution in a private-sector wire transfer system to settle its due-to position can have broad ramifications, including, in the extreme, an inability of the system as a whole to achieve a settlement and the resulting necessity for revocation of many or all of the payments that had been provisionally made and received.[3]

Private-sector wire systems thus function on the basis of their participants' confidence in the creditworthiness of one another, whereas participants on Fedwire need rely only on the Federal Reserve's ability to pay, since a Reserve Bank effectively substitutes its credit for that of senders of payment messages.

The Book-Entry Securities System

The Federal Reserve book-entry securities system is a national system for the issuance, maintenance, servicing and transfer of ownership of U.S. Government and certain Federal agency debt solely in the form of accounting entries on computer files at the twelve Federal Reserve Banks. At present, more than 98 percent of all marketable U.S. Treasury debt is in book-entry form, as well as a similarly high proportion of the debt of several Federally-sponsored agencies. The latter agencies include, among others, the Federal National Mortgage Association, Farm Credit System, Federal Home Loan Mortgage Corporation, Federal Home Loan Banks and Student Loan Marketing Association. And, more recently, some international organizations--the World Bank, the African Development Bank and the Inter-American Development Bank--have begun to issue their securities in Federal Reserve book-entry form.

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[3] For a discussion of this aspect of private-sector wire transfer systems, see the New York Clearing House's April 28, 1989 memo to all CHIPS participants and Applicants regarding "Increased Assurance of Settlement Finality on CHIPS."

Currently more than 150,000 separate securities issues are in book-entry form, and about 2,000 are being added to the inventory each month. In terms of dollar value, the $1.8 trillion of marketable U.S. Treasury debt constitutes the bulk of the total value of securities held in book-entry form. However, in terms of number of issues, those of the Federally-sponsored agencies predominate. Indeed, almost 95 percent of the issues on Fedwire are residential mortgage-backed securities issued by the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation, and those issues currently account for an even higher percentage of the number of new issues being added to the book-entry system. On a typical day, Fedwire processes about 42,000 securities transfers, aggregating more than approximately $350 billion in par value.

When the Treasury and the Federal Reserve first implemented the book-entry system in the late 1960's, the system was restricted to those Treasury issues owned outright by institutions that were then eligible to maintain securities accounts at a Reserve Bank--principally member commercial banks of the Federal Reserve System. In the early 1970's that restriction was relaxed to permit those institutions with book-entry accounts at Reserve Banks to also establish accounts for holding their customers' securities in book-entry form as well. Moreover, with the passage of the International Banking Act of 1978 and the Monetary Control Act of 1980, access to the Federal Reserve book-entry system was also made available to foreign banks with branches or agencies and to all domestic commercial banks, trust companies, savings banks, savings and loan associations, and credit unions that are eligible for Federal deposit insurance. Thus, any depository institution is now eligible to maintain a direct book-entry securities account at its Reserve Bank, provided it also maintains a funds account with its Reserve Bank. At present, about 5,300 depository institutions have book-entry securities accounts at Federal Reserve Banks.

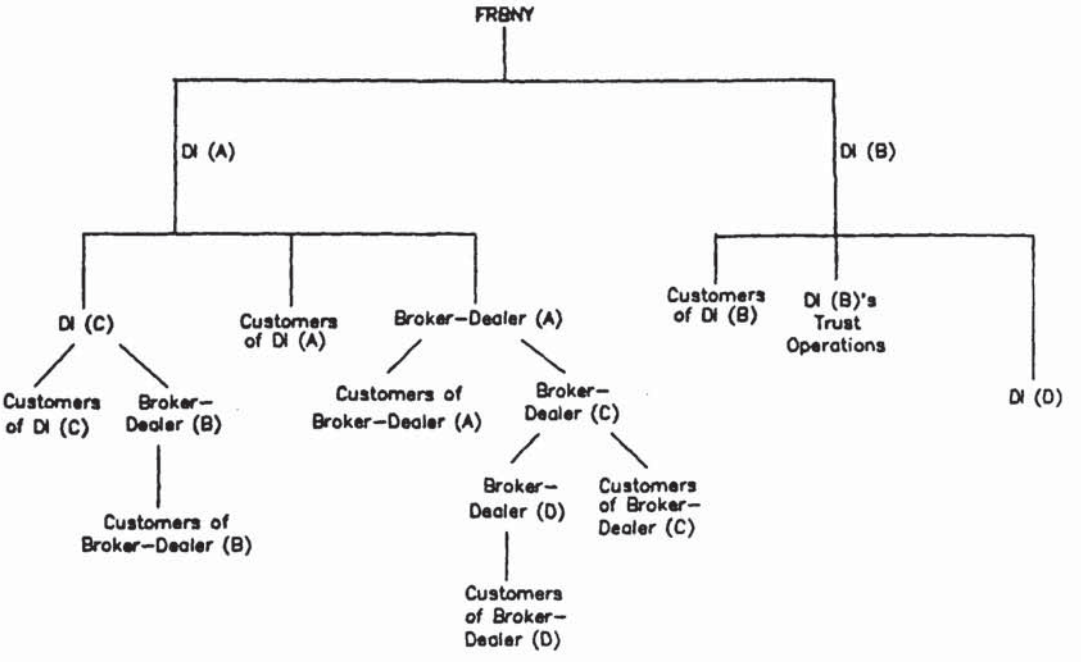
Additionally, each of the fifty states is allowed to have up to two book-entry accounts with the Federal Reserve Banks for the segregation and safekeeping of book-entry Treasury securities investments held by state and local governments. Also, when the Treasury in August of 1986 ceased to make Treasury notes and bonds available to individual investors in engraved paper certificate form, it initiated a new arrangement, called TREASURY DIRECT, which allows individuals to have their own electronic book-entry accounts with the Treasury on the computer files of the Federal Reserve Bank of Philadelphia as fiscal agent for the Treasury. These accounts for individuals are also only for the holding of investments in safekeeping however, and may not be used for other transactions purposes. Finally, many foreign central banks and official international organizations also have book-entry securities accounts in their own names at the Federal Reserve Bank of New York, in which they may transact off-line through instructions to the Foreign Relations Department of the Bank. All of these latter book-entry accounts are for the account-holders own use, however, and are not intended to be used to hold or transfer securities other than those of the account-holders.

Depository institutions with book-entry accounts at Reserve Banks, on the other hand, are under no restrictions as to the individuals and organizations who may maintain and transact in book-entry securities accounts with them. And, in practice, depository institutions maintain records on their own books to identify securities that they hold in their Federal Reserve book-entry account on behalf of their customers, including securities held for correspondent banks, other financial institutions, governmental bodies, corporations, institutional investors, and individuals. Thus, ownership interests in book-entry securities are recorded in a tiered system of accounts, beginning with the Federal Reserve Bank that records the securities in the name of a depository institution, and ending with the entity, which can be several stages removed from the depository institution, in whose records the interests of the beneficial owners of the securities are recorded. Maintenance of records of holdings of book-entry securities at

the aggregate level, however, remains the responsibility of the Reserve Banks in their capacity as fiscal agents of the United States and the other issuers of book-entry securities.

A diagrammatic example of the kind of tiered relationships that exist in book-entry records of ownership is shown on the next page. In this example, only the depository institutions (DIs) labelled (A) and (B) are assumed to have securities and funds accounts directly with the Federal Reserve Bank of New York (FRBNY). All other entities below that level have securities accounts directly, or indirectly through others, with DIs (A) or (B). For instance, a customer of broker-dealer (B) will have its interest in book-entry securities recorded on the books of broker-dealer (B), and the latter will have a corresponding interest in those securities recorded on the books of DI (C). DI (C) in turn will have an ownership interest in the securities recorded on the books of DI (A), and DI (A) will have corresponding ownership recorded electronically on the computer records of FRBNY.

Examples of Relationships
of Institutions Maintaining
Book–Entry Accounts



"DI" signifies Depository Institution

Assume that a customer of broker-dealer (B) instructs that broker-dealer to sell the customer's book-entry securities, and that broker-dealer (B) arranges to sell the securities to DI (D). In the normal course, such a trade will call for delivery of the securities the day after the trade is agreed--i.e., "next-day" delivery--though trades may also be arranged on a same-day or "cash" delivery basis. On the day the securities are to be delivered, DI (A) will, acting on the instructions of broker-dealer (B) as relayed through DI (C), instruct FRBNY to transfer the securities from its account at FRBNY to the account of DI (B). In the great majority of cases this instruction to FRBNY will be received "on-line" and will be automatically processed and executed by FRBNY's computers without any handling by FRBNY personnel. FRBNY's computer will verify that the securities to be transferred are present in DI (A)'s securities account, and will then automatically debit that account in the amount of the securities to be transferred and simultaneously apply a corresponding credit to the securities account of DI (B).[4]

A unique feature of the Fedwire book-entry system is that securities may be, and almost always are, sent against immediate and final payment. That is, in the example presented, DI (A)'s instruction to FRBNY to transfer securities to DI (B) most likely will also specify the price to be paid by DI (B), and that payment instruction will be processed by FRBNY simultaneously with the securities transfer. Thus, at the same time FRBNY debits the securities account of DI (A), it will simultaneously credit DI (A)'s funds account on FRBNY's books for the sale price of the securities. Correspondingly, at the same time that FRBNY credits the securities to the account of DI (B), it will simultaneously debit the funds account of DI (B) on FRBNY's books for the amount to be paid for the securities, as specified in DI (A)'s instructions to FRBNY.

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[4] Note that this requirement that securities to be sent must be present in the sender's securities account precludes an "overdraft"occurring in a sender's securities account with its Reserve Bank. This contrasts with funds accounts in which, as discussed later, overdrafts are permitted on the books of Reserve Banks.

To complete the transaction described above, the message sent by DI (A) to FRBNY must unambiguously specify the particular securities issue to be transferred, the face amount to be transferred, the payment amount, and the party to whom the securities are to be transferred, which must be a party that has both a securities and a funds account with a Reserve Bank. In addition, the message sent to the Reserve Bank may also contain additional information identifying lower tier parties to the transaction. For instance, in the example, the message sent to FRBNY by DI (A) would ordinarily also identify DI (A)'s sending customer, DI (C), and contain instructions to DI (B) to credit the securities received to its customer, DI (D). The message sent by DI (A) is, after processing by FRBNY, forwarded to DI (B) as confirmation of the transaction, and this additional information assists DI (B) in relating the transaction to instructions it will have received beforehand from DI (D) to accept delivery and pay for the securities on its behalf.

Normally securities systems begin their processing cycle by matching trade instructions, clearing the transaction and then delivering securities against payment. The Fedwire book-entry system differs from most of the world's securities systems in that matching of instructions takes place after the securities movement and payment are final during the reversal period just prior to closing. This approach has provided for a fast and efficient system that supports the implementation of monetary policy and fulfillment of the U.S. Treasury's debt requirements on a same day basis.

Federal Reserve Risk on Fedwire Funds Transfers

The Federal Reserve Banks are at risk on Fedwire funds transfers if a depository institution's transfers of funds result in an overdraft (negative balance) in its account with its Reserve Bank. Since the receiving Reserve Bank will, as discussed earlier, have given final and

irrevocable credit to the recipients of funds sent over Fedwire by the transferring depository institution, the Reserve Bank serving that sending institution cannot recover the account shortage from the recipients, and would have to absorb whatever loss flows from its resultant creditor position.

The magnitude of the theoretical Fedwire exposure faced by the Reserve Banks is not trivial, since overdrafts incurred on the books of the Reserve Banks by depository institutions as a result of funds transfer activity on Fedwire now run in the neighborhood of $70 billion daily.[5] However, Reserve Bank risk of financial loss is far smaller than such a number would imply. A Reserve Bank will experience a loss from such intra-day extensions of credit on Fedwire only if a depository institution fails in an unsecured overdrawn position without warning. This is because a Reserve Bank will make every effort to prevent a financially troubled institution from sending funds transfers over Fedwire unless the institution has sufficient funds available in its Reserve Bank account to cover the charge to the account.[6] The argument that Reserve Bank risk is manageable tends to be supported by the fact that the Reserve Banks to date have never suffered a single loss from the operation of the Fedwire funds transfer network as a result of the closing of an institution.

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[5] The causes of daylight overdrafts on the books of Reserve Banks are varied and complex, but generally relate to cash management practices of depository institutions and their corporate customers that are designed to minimize the overnight holding of non-interest bearing money balances. For instance, a major source of daylight overdrafts on Fedwire is the Federal funds market, in which depository institutions with excess non-interest bearing balances at their Reserve Banks routinely sell (lend) those balances, typically on an overnight basis, to other depository institutions in need of such funds. As those funds are then paid back by the borrower in the morning over Fedwire, the borrower may temporarily overdraft its account with its Reserve Bank, but then restore the balance later in the day with new borrowings of Federal funds or with other funds credited to its account.

[6] At the same time, "The Federal Reserve also stands ready to provide payment mechanism services to troubled depository institutions that other providers of payment services may not serve because of the risks involved. This helps to ensure that the inability of a depository institution to make or process payments will not trigger its insolvency and that the institution's problems can be resolved in an orderly fashion with a minimum of disruptive effects." See Board of Governors of the Federal Reserve System, "The Federal Reserve in the Payments System," 70 Federal Reserve Bulletin (September, 1984) p. 709.

In any event, as it became increasingly clear in recent years that the credit risk exposure of Reserve Banks arising from daylight overdrafts was increasing, the Federal Reserve began to take steps to limit that exposure. In 1982, the Board of Governors directed the Reserve Banks to apply moral suasion to reduce overdrafts on their books by counseling those institutions that regularly incurred Fedwire overdrafts in excess of 50 percent of their capital. At the same time, the Federal Reserve began an extensive review of the risks associated with daylight overdrafts generally--not just those on Fedwire but on private electronic payments systems as well--and of the methods available for con- trolling and reducing those risks without harming the efficiency of the payments system. Following that study, the Board of Governors in March of 1984 requested public comment on the possible components of an overdraft risk reduction policy, including both the goals that such a policy should seek to attain and several possible methods for controlling and reducing that risk. After receiving and evaluating the public's comments, the Board in May of 1985 issued its policy statement regarding risks on large- dollar electronic funds transfer systems.

The policy adopted by the Board of Governors relies heavily on voluntary efforts of depository institutions to reduce the aggregate amount of risk they each present to payments systems. Specifically, the Board asked each depository institution that incurs daylight overdrafts on Fedwire or participates on private-sector large-dollar wire networks voluntarily to adopt a cap or limit on the total amount of "overdrafts" it incurs at any time of the day across all large-dollar funds transfer networks, including Fedwire, with the cap set according to self-assessment guidelines established by the Board.[7] Those guidelines require a depository institution to address and rate its creditworthiness, its operational controls, policies and procedures, and its

[7] While this is referred to as the Board's daylight overdraft reduction program, the payments exposure created in CHIPS by a participant is not, strictly speaking, an overdraft in an account of the CHIPS participant, but rather the net debtor (due to) position of the participant relative to all other CHIPS participants at any point of time during the day.

credit policies and procedures. The self-evaluation performed in each of these three areas is then combined by the depository institution into an overall self-assessment which serves as the basis for the institution's determination of its overdraft limit as a multiple of its capital.

Consistent with the voluntary, flexible approach adopted, a depository institution's compliance with its self-determined overdraft cap is monitored by its Reserve Bank on an ex-post basis. That is, an institution incurring a cross-system (Fedwire and CHIPS) funds transfer overdraft position in excess of its cap is contacted after the fact by its Reserve Bank with a view to discussing ways to eliminate the institution's excess use of such intra-day credit. If an institution were to persist in exceeding its cap, the Federal Reserve could be expected to deal with the situation more formally.

While the risk reduction policy adopted by the Board of Governors was designed to apply across all large dollar funds transfer systems, and not just to Fedwire, it has components that apply strictly to Fedwire. First, the cross-system daylight overdraft cap a depository institution sets for itself through the self-evaluation process is also the maximum permissible overdraft on Fedwire. That is, net credits on private-sector wire systems cannot be used by a depository institution to increase the amount of overdrafts incurred on the books of Reserve Banks. Moreover, the allowable overdraft on Fedwire is reduced to the full extent that an institution also incurs overdrafts on other networks. Also, a Reserve Bank may continuously monitor an institution's account when it believes the institution is exposing the Reserve Bank to an undesirable level of risk. In more severe cases, the Reserve Banks may also unilaterally reduce the institution's Fedwire cap, impose collateral or special balance requirements, hold or reject outgoing Fedwire transfers during the day until the institution has sufficient covering balances in its Reserve Bank account, and--in the most extreme case--terminate the institution's access to Fedwire.

Fedwire Securities Transfers and Reserve Bank Risk

Fedwire securities transfers, like funds transfers, expose Reserve Banks to risk of loss when a depository institution, at any point in the day, has received over Fedwire a greater dollar value of securities than it has sent. Since, in such a situation, the corresponding debits to the institution's Reserve Bank funds account for the value of securities received will exceed the credits to its account for the value of securities sent, Fedwire securities transfers can and do create daylight overdrafts in funds accounts on Reserve Bank's books in much the same fashion as funds transfers. And, the magnitude of those overdrafts ia about $60 billion a day.

Overdrafts caused by book-entry securities transfers, however, have at least two characteristics that distinguish them from funds transfer overdrafts. First, book-entry overdrafts are much more concentrated among a few depository institutions. Indeed, about three-fourths of all book-entry overdrafts on Reserve Banks' books are accounted for by four New York City banks that clear (receive in and transfer out) book-entry securities on behalf of their securities dealer customers. This high degree of concentration, while increasing the Reserve Bank's risk exposure to particular institutions, makes it possible to focus the monitoring of that risk more sharply. Second, since the book-entry system largely involves value-for-value transfers--i.e., securities for money--a book-entry overdraft on a Reserve Bank's books has its close counterpart in equivalent-value holdings by the over-drafting depository institution of securities received in for the account of, but not yet paid for or resold by, the depository institution or its customers. This latter characteristic of book-entry related overdrafts has always offered the possibility of a Reserve Bank establishing a claim against the securities underlying the daylight overdraft credit extended by the Reserve Bank for their purchase.

In adopting the daylight overdraft controls for the funds transfer overdrafts described in the preceding section, the Board of Governors exempted from quantitative

limitations overdrafts on Reserve Banks' books caused specifically by book-entry securities transfers. This was done out of concern that inclusion of such book-entry overdrafts within a quantitative cap or limit might have adverse effects on the Government securities market and/or on the conduct in that market of open market operations in Government securities through which the Federal Reserve implements monetary policy. When the Board adopted the funds transfer overdraft risk reduction policy, it did, however, begin to explore other means of controlling and reducing book-entry overdraft risk to Reserve Banks.

To this end, the Board of Governors has on two separate occasions published for comment proposals to provide for the collateralization by depository institutions of their book-entry related overdrafts on Reserve Banks' books. The first set of proposals was published in May 1985, and the second in December 1986.

The Board has, however, adopted some alternative steps aimed at reducing book-entry overdrafts. First, and most importantly, the Board imposed a maximum transaction size limit on book-entry securities transfers of $50 million, which took effect in January 1988. This transaction size limitation was imposed to reduce a current practice in the Government securities market, called "position building," that is considered to be a major source of book-entry overdrafts. Under that practice, a dealer with a large order from an investor for, say, $200 million of securities, will accumulate, perhaps in several purchases during the day, the entire amount of the order before wiring the securities to the investor. As a result, the dealer's clearing bank will receive in during the day the entire $200 million of securities for the dealer, incurring a $200 million charge that can contribute to an overdraft with its Reserve Bank, before receiving an instruction from the dealer to wire the securities to the investor against covering payment to the clearing bank. The $50 million transaction limit imposed by the Board is designed to change this practice by requiring the dealer to wire the securities to the investor in multiple deliveries as they come in to the dealer's clearing bank account during the day. In the

above example, the potential maximum clearing bank overdraft created by the transaction will thus be reduced from $200 million to as little as $50 million, depending on how quickly partial deliveries are made as securities are accumulated. And, to assure that deliveries are made quickly, the Board has stated that it will be deemed an unacceptable use of Fedwire to avoid the intent of the transaction size limitation by continuing to build securities positions and sending multiple deliveries of $50 million or less in rapid succession to the purchaser.

Additionally, the Board asked the Federal Reserve Bank of New York to continue to monitor the trading practices and policies of securities dealers with a view to identifying and seeking to modify market practices that contribute unduly to book-entry overdrafts.

When these steps were decided by the Board of Governors in July of 1987, the Board also announced that it would immediately undertake a full review of its long-run strategy and goals for controlling and reducing payments system risk. A task force established by the Board of Governors worked with an advisory group from the private sector in addressing these issues. In August 1988 they recommended the use of "market forces to provide intraday credit, in combination with regulatory oversight" to address payments system risk. They also made four specific suggestions:

1. A level of free overdrafts should be established to reflect the operational delays of a complicated network.

2. Pricing should be introduced for Fedwire overdrafts above the free level and below the cross system cap.

3. Cross system net debit caps established through a self evaluation process and Federal Reserve guidelines should continue and perhaps be reduced subsequent to pricing introduction.

4. An announcement of a specific introductory date should be made after implementation issues have been addressed.

Substantial implementation issues were also raised by the Large Dollar Payments System Advisory Group's recommendations which Federal Reserve staff analyzed and weighed over a period of nine months.

1989 - Proposals for Modifying the Payment System Risk Reduction Policy

In May 1989 the Board of Governors proposed modifications (incorporating suggestions of the Advisory Group) to present payments system risk reduction policies which include the introduction of pricing and employment of collateral, the inclusion of book entry items in the definition of overdrafts and a redefinition of net debit cap use and overdraft measurement as well as guidelines for private networks and systems. All modifications, except private networks and systems guidelines, are presently available for public comment through November 17, 1989.

Fedwire overdrafts subject to pricing are expected to be based upon the average daily intraday total funds and book-entry overdraft in excess of 10 percent of a DI's risk-based capital ("the deductible"). Pricing is expected to be phased in over a three year period beginning in 1991, culminating in a 25 basis point (annual rate) charge. Overdraft measurement is expected to be modified through changes in the sequence of posting of non-wire transactions to a DI's account.

In regard to net debit caps the cross system cap will be abolished when CHIPS implements settlement finality, only the Fedwire cap will remain. Small DIs may be exempt from filing a Fedwire net debit cap if their daily overdrafts are less than $10 million and 20 percent of risk based capital. The cap multiples for DIs filing will be related to risk-based capital (Tier I & II) definitions not the previously employed adjusted primary capital. If a DI's total Fedwire overdraft exceeds the net debit cap frequently or routinely by material amounts solely because of book entry overdrafts, the total Fedwire overdraft will have to be collateralized. It is further

expected that foreign bank branches and agencies will collateralize all Fedwire overdrafts which exceed their cap multiple times U.S. capital equivalency. (Total overdrafts must remain less than cap multiples times world-wide capital.)

In addition, regardless of cap standing, a DI must file a board-of-directors resolution if (a) it authorizes another entity to make Fedwire payments or receive book entry transfers for its account or (b) makes transfers to an affiliated DI to fund the affiliates reserve account intraday.

Interim Policy - Immediately Effective

The Board of Governors also instituted an immediately effective interim policy in the areas of private networks/systems and Fed Funds and Repurchase Lending agreements.

Book-entry delivery-against-payment systems that wish to net settle on the books of the Federal Reserve must adopt as a system safeguards for liquidity and credit, prohibit settlement unwinds, and provide open settlement information to participants. Offshore dollar clearing networks that wish to settle on a net basis directly through Fedwire or indirectly on CHIPS should be supervised by a relevant central bank or authority. The offshore system should make participants risk responsible, develop a means for assuring settlement finality and have a settlement agent in the U.S. through which satisfactory settlement can be ascertained.

Finally, the Board has expressed its support of modification to federal funds and repurchase lending arrangements so as to eliminate or reduce repayment each morning followed by re-lending to the same borrower each afternoon (causing daylight overdrafts for the borrower). Lenders should be aware of the resultant slightly reduced liquidity and should satisfy themselves that the terms and conditions of such arrangements maintain their flexibility.[8]

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[8] For more extensive coverage and discussion of these proposals and interim policies see: "Proposals for Modifying the Payment System Risk Reduction Policy." prepared by the Staff of the Federal Reserve System, May 1989.

An Overview of the Operations of

The Options Clearing Corporation

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THE OPTIONS CLEARING CORPORATION

I. OVERVIEW

The Options Clearing Corporation (OCC) is a registered clearing agency regulated by the Securities and Exchange Commission (SEC). It clears and settles options traded on five exchanges -- the American Stock Exchange (AMEX), the Chicago Board Options Exchange (CBOE), the New York Stock Exchange (NYSE), the Pacific Stock Exchange (PSE) the Philadelphia Stock Exchange (PHLX) -- and one electronic market -- the National Association of Securities Dealers Automated Quotations (NASDAQ). These six entities (hereafter called owner-exchanges) share equally in the ownership of the OCC.

The OCC issues options, provides facilities for the clearance and settlement of exchange-traded options transactions, guarantees such settlement, and provides incidental services to its clearing members and to the markets on which options are traded. During 1988, the OCC's cleared option volume was 195 million transactions, with an average daily volume of 744,501 contracts. On October 16, 1987, the OCC cleared a record 2.98 million options contracts.

Options issued by the OCC are standardized contracts on specified underlying instruments, in multiples of standard amounts, with predetermined exercise prices and standard maturities. When the OCC accepts a matched trade from one of its owner-exchanges, the contract between the buyer and seller is severed and two new obligations are created -- one between the buyer and the OCC, and one between the seller and the OCC. Thus the OCC assumes ultimate responsibility for performance on the option. By becoming the counterparty in every transaction, the OCC is able to net transactions which, in turn, has led to the development of a strong secondary market.

A clearing member that buys an option looks to the OCC rather than to any particular option writer for performance and relies on a delivery system established by the OCC.[1] Similarly, the obligations of options writers are owed to the OCC rather than to particular buyers. The obligations of a "public" writer (i.e., a client of a clearing member) to the OCC are guaranteed by its clearing members, which generally are registered broker/dealer firms that carry the accounts of writers or their brokers. At year-end 1988, the OCC had approximately 180 clearing member firms.

The OCC protects itself from the risk arising from its guarantor-of-settlement function by requiring clearing members to provide it with margin or other collateral for the writers' positions that it carries and to contribute to stock and non-equity clearing funds that protect the OCC against a clearing member's failure. As of the end of 1988, the combined margin deposits and deposits of underlying securities at the OCC and its futures-clearing subsidiary, the Intermarket Clearing Corporation (ICC), were valued in excess of $6.2 billion.

The OCC's processing begins each evening when "matched trade" data resulting from the day's trading at each of the six owners received and entered into the OCC's clearance and settlement systems. Clearing member transactions are processed to determine each member's overall position and its aggregate settlement obligations and margin requirements. Every morning, before 8 a.m. Eastern Time[2] each member receives various reports detailing the previous day's trading activities. Following the distribution of these reports, the OCC, in conjunction with its clearing banks, settles financial obligations it has incurred with its members.

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[1] The OCC guarantee applies to its clearing members only and does not protect clients of a clearing member from a clearing member failure. The OCC guarantee is not effected until the OCC "accepts" the trade and issues the option contract, generally on the first business day after the trade at 1 p.m. Eastern Time.

[2] Unless otherwise noted, all times referred to in this paper are Eastern Time.

Clearing members that owe money to the OCC are required to settle their obligations to the OCC by 10 a.m., while the OCC has until 11 a.m. to settle its obligations to its clearing members.[3] The morning money settlements complete the settlement process for the prior business day.

The OCC is headquartered in Chicago, with branch offices in New York, Philadelphia, Toronto and San Francisco. It also maintains data centers in Chicago and New York.[4] The OCC is managed by a board of 16 directors, nine of whom represent clearing members, six who represent each of the owner-exchanges, and one who is the chief executive officer of the OCC. The Board of Directors is responsible for the overall management of the OCC. It has the power to change, add, and interpret the rules of the Corporation. It may impose fees and charges and may issue operating procedures, orders, and directions. It may also interpret the Corporation's by-laws. Board members also serve on committees such as the margin, audit, membership, and performance committees. Each committee sets policy in the area for which it is responsible.

Board members representing clearing member firms are elected for 3-year terms. Each member/director may serve no more than two consecutive terms. In addition, no clearing member firm may have more than one representative on the Board at any time.

II. CLEARING MEMBERS AND CLEARING MEMBER ACCOUNTS

A registered broker-dealer, or a foreign securities firm subject to foreign governmental regulation, is eligible to become a clearing member of the OCC if it: 1) meets

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[3] Thus, the OCC serves as an intermediary between its clearing members, and simply re-transfers the money paid to it at 10 a.m. to the clearing members with credit positions at 11 a.m. Under this arrangement, the OCC will only turn to its financial resources in the event of a fail.

[4] The New York site serves as a backup to Chicago for contingency purposes.

financial requirements as specified by the OCC; 2) proposes to engage in the clearance of options transactions either for its own account or for the accounts of customers; and 3) maintains adequate operations, automated facilities and experienced personnel. Current membership standards are described in Section III of this paper.

The OCC monitors the financial condition of its members on an ongoing basis and requires its members to keep it abreast of changes in the firm's financial condition by requiring firms both to submit a monthly financial report and to give it an "early warning" if the firm's own recordkeeping indicates a problem. From the data supplied in the monthly financial report, the OCC performs its own analysis of the firm's financial condition. The OCC also requires members to submit certain reports (i.e., FOCUS reports) that the member files with the SEC.

The OCC has established a set of objective criteria which it uses to determine when the financial condition of a clearing member is deteriorating. These criteria are divided into four levels called Watch Levels, with Watch Level IV reserved for the most troubled firms. Once a clearing member's financial status triggers Watch Level II criteria, the clearing member is required to supply the OCC with more detailed and frequent financial data. Once a clearing member reaches Watch Level III, it will also be required to post higher margin on its positions, equivalent to 130 percent of the normal margin. When a clearing member triggers Watch Level IV criteria, it also may be restricted with regard to its positions with the OCC, including limitations on the clearance of opening transactions. A clearing member will be removed from Watch Level restrictions when it improves to the point where its financial position no longer exceeds the Watch Level thresholds. As of March 1988, 15 percent of the OCC's membership was on Watch Level II or more severe status. During the post-market break period of November and December 1987, that figure was 83 percent.

Members maintain one or more accounts with the OCC depending on the nature of their business activities. Members are required to maintain separate accounts for the firm itself, for specialists or market-makers, and for the firm's customers. Six different types of accounts are distinguished.

Firm accounts include transactions cleared and positions carried on behalf of the member's "noncustomers" (i.e., the member itself or an officer, director, or partner of the member). The OCC is allowed to maintain a lien on all long positions (i.e., positions of the options holders) and all other securities, margin, and other funds pertaining to this account as security for all of the member's obligations to the OCC. In addition, the OCC has the right to close out the positions in the account and apply the proceeds at any time without prior notice.

Market-maker or specialist accounts include transactions cleared and positions carried by the member on behalf of a market-maker or specialist. A clearing member who is registered with an exchange as a market-maker or specialist also may maintain a separate market-maker account confined to its activities in its role as market-maker or specialist. As with a firm account, the OCC has a lien on all long positions, securities, margin and other funds in that account.

Combined market-makers or specialists accounts are maintained for those market-makers and specialists who have agreed with the member and the OCC that the positions of such market-maker or specialist may be commingled in a combined account with positions of other market-makers or specialists.

Customers' accounts are maintained by every member that conducts a public business. This account is confined to the transactions of its customers, other than market-makers or specialists. The member, on behalf of itself and each customer on whose behalf positions may be maintained in the customer's account, must allow the OCC to maintain a lien

on all unsegregated long positions[5] and on all other securities, margin and other funds in that account.

Members also may maintain a separate pledge account for each market-maker, specialist or combined account. These accounts allow members to use in-the-money options as collateral at banks to secure loans or lines of credit. The member may transfer any long position to the pledge account, provided that the primary account from which the transfer is made is adequately margined, and may pledge all or any part of the position. In the event of such pledge, the rights of the OCC with respect to the pledged long positions are subordinated to the rights of the pledgee. Each pledge account is treated by the OCC as a separate account, distinct from the primary account, and the long position in the pledge account is not considered in determining the amount of margin required in the primary account. Upon release by the pledgee and the request of the member, the OCC will retransfer any long position in a pledge account to the primary account.

Finally, a member may maintain a registered trader's account, which is essentially the same as a market-maker/specialist account, except that it is confined to the transactions of a registered trader. A member may also offer a combined registered traders account.

III. RISK MANAGEMENT BY THE OCC

The OCC has in place three levels of safeguards designed to ensure performance by clearing members. These safeguards consist of membership standards, margin requirements, and clearing funds. The Margin Committee of the OCC's Board of Directors determines the risk management policy of the OCC.

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[5] Unsegregated long positions are those which have not been pledged to an entity other than the OCC (for example, as collateral at a bank).

A. MEMBERSHIP STANDARDS

The OCC considers membership standards its "first line of defense" against failure of a clearing member. The OCC is concerned with not only the financial stability of the firms, but also their operational performance records.

In assessing an application for membership, the OCC reviews the firm's financial statements and conducts an on-site inspection. The OCC continues to monitor the financial condition of a firm once it has been accepted as a member by requiring it to disclose financial information, such as FOCUS filings made to the SEC.

Current OCC membership standards require that every clearing member have initial net capital (as defined by SEC rules) of $150,000 or more. Moreover, its initial net capital may not be less than 12 1/2 percent of its aggregate indebtedness. A clearing member's net capital may fall below that amount as a result of transactions in the regular course of business, but a clearing member may not engage in or clear any opening transaction if its net capital falls below $100,000, or is less than 6 2/3 percent of its aggregate indebtedness. A clearing member is required to notify the OCC promptly if its net capital falls below $150,000 or 10 percent of its aggregate indebtedness.[6]

In addition to minimum financial standards, the OCC sets standards in the area of recordkeeping and with respect to the experience of the firm's personnel.

B. MARGINING

The OCC has two different methods for calculating margins: one for equity options and another for non-equity options. Both methods mark the premium to market daily.

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[6] In practice, the percentage amounts are actually less since the majority of OCC clearing members elect to operate pursuant to the SEC's alternative net capital requirements and are subjected to these requirements instead. This means that the size of a firm's capital relative to its aggregate indebtedness may in fact be below the levels cited here.

In addition, both require that clearing members put up a "cushion" to protect against price fluctuations. The calculation of the cushion represents the difference in the two methods.

The OCC requires additional margin (i.e., the cushion) because it is exposed to the risk that the price of an option will change in the 24 hours before the next margin is paid. For equity options, the OCC requires additional margin of 30 percent of the current market value of the option. For non-equity options, the calculation of additional margin is more complex. Using the Theoretical Intermarket Margin System (TIMS), which is based on the Cox-Rubinstein options pricing model, the OCC calculates what the price of the option would be over a range of potential prices for the underlying interest (based on either the 3-month or 1-year standard deviation of the price change of the underlying, whichever is greater). The difference between the new option value (when calculated at the end of the OCC's confidence interval) and the current option value is the additional margin.

To protect itself further, the OCC reserves the right to make intraday margin calls to be used when it perceives significant price and volatility changes. The OCC's policy is to make intraday margin calls on equity options when the S&P 500 Index moves 1.25 percent or more on a given day. If the index moves an additional 1.25 percent, a second intraday margin call will be made, etc. For non-equity options, the OCC's policy is to issue an intraday margin call when the price of the underlying moves more than 75 percent of the applicable margin interval or when the option price has experienced a market move equivalent to more than 75 percent of its projected liquidation value. Once the OCC decides to issue a margin call and has calculated the margin due, it notifies its clearing banks of the margin amounts and then allows one or two hours before collecting the margin to allow time for the clearing members to post collateral.

C. CLEARING FUNDS

The OCC has a clearing fund to cover losses incurred when membership standards and options margins do not provide adequate protection. Clearing members maintain contributions in the clearing fund based on the activity in their accounts the previous month. Should a clearing member default or a settlement bank fail (or when there is any other problem where margin deposits would not be sufficient to cover a loss), the OCC can turn to its clearing fund to provide a source of liquid assets to cover its financial responsibilities. If the OCC draws on its clearing fund, it can charge the loss pro rata to clearing members maintaining deposits in that fund. At year-end 1988, the OCC's clearing fund deposits exceeded $193 million.

There are separate equity and non-equity clearing funds, although if one fund is exhausted, the OCC is permitted to use the other to meet its obligations. If both clearing funds are exhausted, the OCC will apply its net worth to cover the loss. At year-end 1987, the OCC's net worth was slightly over $6 million.

IV. OPTIONS ISSUED BY THE OCC

An option is a contract that gives the option buyer or holder the right to buy (a call option) or sell (a put option), a specified amount of an underlying commodity, currency, or financial asset at a fixed or determinable price (called the "exercise" or "strike" price) before or at a certain date.[7] In return for a nonrefundable price (the "premium"), the writer of the option is obligated to buy or sell the underlying interest according to the terms of the contract if the option is exercised. In addition, an option can convey the right to assume a futures position at a specified price (although the OCC itself does not issue options on futures). The writer is

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[7] Exchange-traded options have fixed strike prices. Strike prices of over-the-counter options may be negotiated.

obligated, if and when the option is exercised, to perform according to the terms of the option. As a note of terminology, sellers are considered to be in the "short" position because their loss potential[8] is unlimited. Conversely, options buyers are considered to be in the "long" position since their profit potential is unlimited.[9]

An option holder has three choices: to exercise the option, to let it lapse, or to sell it to a third party. In recent years, there has been a strong trend toward the use of "traded" options, where the holder sells the option to a third party. In fact, the majority of participants in the options market elect to liquidate their positions in the secondary market by buying or selling an option which exactly offsets their position. This procedure is known as a "closing transaction." The popularity of closing transactions for in-the-money options (i.e., those options where the exercise price is below the current market price of the underlying security in the case of a call, or above the current market price in the case of a put) is because transactions costs for buying or selling an offsetting option are often less than taking delivery of the underlying interest.

There are two types of exchange-traded options in the U.S.: American options and European options. The difference between the two types of options is that American options can be exercised any time before they expire, while European options can be exercised only on their expiration date. In practice, there is little difference between American and European options. A holder of an American option is unlikely to exercise his option before its

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[8] "Loss" in this sense means that for the premium received, the seller must deliver the stock if called upon regardless of the value of the stock at the time of delivery. The magnitude of the loss is the difference between the delivered price and the premium received.

[9] The terminology used here is different from that used in the equities markets, where "short" means that you sold a stock without actually owning it and "long" means that you own the stock. The corresponding terms in the options markets are "uncovered" and "covered" (i.e., when you write a call option and own the underlying, you are considered covered. If you write a call option without owning the underlying, you are considered uncovered).

expiration since he will lose the remaining "time value" of the option, therefore, most American options buyers hold the option until expiration. If the option is "in-the-money" at expiration, the clearing member will notify the OCC, which in turn will assign the option to a writer maintaining that position. The OCC assigns an option by randomly choosing a clearing member who has written such an option to perform according to that contract. The clearing member is notified that it has been assigned to an option in the exercise and assignment report which is issued prior to 8 a.m. each morning. If the option is "out-of-the-money" at expiration, it simply expires.

There are three key aspects which distinguish an option from other financial instruments. First, an option confers on the holder a right, but not an obligation to buy or sell. Second, the risk to the holder is known and limited to the amount of the premium, which is paid for up front, while the risk to the writer is potentially unlimited. And, third, options provide a system of leveraged buying and selling, because the price paid for the right to buy or sell is ordinarily much lower than the value of the underlying interest. Due to their low cost, options have been popular in hedging large portfolios held by financial firms and insurance companies.

The premium payment date on which the premium is due and payable is usually the same as the transaction date.[10] Most option contracts state a specific basis on which the settlement price will be determined, such as the closing price on the exercise date. The settlement day, on which delivery of the underlying interest is required, is specified in relation to the exercise date. The settlement date for American options is usually one or two days after exercise. For European options it normally is one or two days after the expiration date.

The OCC currently issues options covering four general types of underlying interests: common stocks, stock indices, Treasury securities, and foreign currencies. Clearance

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[10] The OCC actually issues an option contract on the first business day after the trade is made (i.e., the transaction date is "T+1").

and settlement procedures for each of these types of options are described below. The main areas of growth are options on the latter three instruments; equity option volume essentially has been flat in recent years.

V. TYPES OF OPTIONS CLEARED AND SETTLED THROUGH THE OCC

A. STOCK OPTIONS

Stock options issued by the OCC have standardized expiration dates and exercise prices. Stock options usually expire on the Saturday immediately following the third Friday of the exercise month. Customers have until Friday immediately preceding expiration to exercise their options.

Each stock option generally covers 100 shares of the underlying stock. However, the number of underlying shares may be adjusted due to stock splits as discussed below. The exercise price of a stock option is stated in dollars per share. Thus, an XYZ 40 call option gives the buyer the right to purchase 100 shares of XYZ stock at a price of $40 per share, or a total price of $4,000.

Stock dividends and/or stock splits can result in an adjustment in the number of shares covered by an option or the exercise price or both. For example, suppose an investor bought an XYZ 60 option -- either a call or a put -- and XYZ corporation subsequently effected a 3 for 2 stock distribution. Instead of covering 100 shares of stock at an exercise price of $60, each outstanding option would be adjusted to cover 150 shares at an exercise price of $40 per share. There is an exception to this arrangement when a stock distribution results in the issuance of multiple shares of new stock for each outstanding old share -- such as a 2 for 1 stock split. In this case, the number of shares covered by a single option is not adjusted. Instead, the number of options is proportionately increased and the exercise price is

proportionately decreased. For example, before a 2 for 1 stock split, suppose an investor holds an option on 100 shares of XYZ stock with an exercise price of $60. After adjustment for the split, he will hold two XYZ options, each on 100 shares of stock and with an exercise price of $30.

As a general rule, no adjustment is made for ordinary cash dividends or distributions."

B. STOCK INDEX OPTIONS

Stock index options are financial instruments which give the holder the right to profit from the difference between the strike price of a basket of securities and the actual market price of that same basket. Stock index options participants do not buy and sell baskets of securities. Instead, they settle the price difference in cash. The aggregate price of the securities is usually indexed to 100 for a given base period, and subsequent price changes are quoted in relation to this index. An index multiplier is used to convert the index to a dollar amount equivalent to the market price of the basket of securities. The difference between the contract price on the option (the strike price) and the market price is the cash settlement amount.

Index options expire the Saturday following the third Friday of the expiration month. They settle on the first business day following exercise.

C. TREASURY DEBT OPTIONS

1. TREASURY BILL OPTIONS

Options on treasury bills are European-style options on 13-week Treasury bills with each option involving $1,000,000 of principal. The underlying security is that security which would be delivered in the event that a Treasury bill option is exercised. That underlying Treasury

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[11] Since the call holder becomes entitled to the dividend if he/she exercises the option prior to the ex-dividend date, a call writer's chances of being assigned an exercise increase as this date approaches.

bill is the "current" bill[12] with a full 13 weeks remaining to maturity as of the settlement date. In effect, it is a market in options on 13-week Treasury bill rates rather than on specific Treasury bills.

To establish a relationship between option exercise prices and quotations for Treasury bills in the cash market, exercise prices for Treasury bill options are based on annualized discount rates (that is, the discount from par at which a hypothetical 360-day Treasury bill could be purchased or sold). As a practical matter, however, exercise prices are expressed as complements of discount rates (100 minus the annualized discount rate) for the purpose of conformity with other kinds of options, where the established rule is that a higher exercise price calls for a higher dollar price in the event of exercise. For instance, a Treasury bill call with an exercise price of 90 entitles the holder to purchase the underlying Treasury bills at an annualized discount of 10 percent. A call option with an exercise price of 91 would offer a discount of only 9 percent, and thus more money would be demanded upon exercise.

2. TREASURY NOTE AND BOND OPTIONS

Treasury note options and Treasury bond options may be either American-style or European-style options. These two types of options encompass specific issuances of bonds or notes (e.g., the 9 1/8 percent Treasury bonds due May 2018). Upon exercise of one of these options, only the specified issue may be delivered. (However, if there is a shortage of the underlying issue, the OCC may authorize a substitute delivery.) Not all Treasury issues have options. Instead, exchanges select those Treasury issues for which it wants to trade options. OCC Treasury options are traded on the AMEX and the CBOE in the following Treasury note and bond securities: 5-year notes (CBOE), 10-year notes (AMEX), and 30-year bonds (CBOE).

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[12] Meaning any Treasury bill with 13 weeks left to maturity. For example, a 26-week bill with 13 weeks left to maturity could be delivered upon exercise of a 13-week T-bill option.

When an exchange chooses a new Treasury issue for options trading, that option will be offered shortly after the issue is auctioned by the Treasury.

Exercise prices for Treasury bond options and Treasury note options are expressed in the same way as prices in the cash market for the underlying securities -- that is, as a percentage of par value. Premiums for Treasury bond options and Treasury note options are expressed in terms of points and 32nds, with each 1/32 representing 1/32 of one percent of the unit of trading.

D. FOREIGN CURRENCY OPTIONS

Foreign currency options give the holder the right to buy or sell a specified amount of a given foreign currency at a predetermined price. The OCC issues options on eight currencies: Deutsche marks, Swiss Francs, Canadian dollars, British pounds, French francs, Japanese yen, Australian dollars, and European Currency Units.

When foreign currency options are exercised, the foreign currency settlement amount is delivered to a settlement bank in the country of origin of the currency, while the U.S. dollar settlement amount is delivered to a settlement bank in the U.S.

Foreign currency options expire the Saturday preceding the third Wednesday of the expiration month. They normally settle four business days after exercise. However, options exercised at expiration (Saturday) settle the following Wednesday.[13]

VI. SETTLEMENT OF OPTION PREMIUMS

The OCC has established specific banking procedures to settle cash amounts due to the OCC and clearing member firms. Option premiums are settled in cash through these

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[13] For more information on market and trading practices, see FRBNY monograph entitled "Trading of Foreign Currency Options and Futures in Philadelphia," February 1989.

established banking channels. The OCC requires that member firms establish and maintain a special account for OCC transactions at any one of 16 (15 in the U.S., one in Toronto) of the OCC's designated clearing banks. The bank selected by a member firm is called its designated clearing bank. These special accounts allow the designated clearing bank to debit and credit the member firm's account according to instructions in the OCC's daily settlement reports.

The OCC sends transfer instructions to the clearing bank by 9 a.m. The clearing bank notifies the OCC by 9:45 a.m. that at 10:00 a.m. the funds will be transferred from the clearing member's account to the OCC's account. If a clearing bank notifies the OCC that a transfer of funds will not be executed for any clearing member for any reason, it is the clearing member who is responsible and will be held accountable. When funds are due the clearing member, the OCC pays the clearing member's account at its clearing bank by 11:00 a.m.

While premium and margin settlement amounts are netted in the OCC's daily settlement transactions, delivery obligations related to the exercise of an option are stated separately and never netted with the premium and margin settlement amounts. In addition, the OCC settles each of the clearing member's accounts separately and never nets them. For example, if a clearing member owes the OCC $1,000 for his customer account and the OCC owes the clearing member $1,000 for his firm account, the OCC will draft $1,000 at 10 a.m. from the clearing member's bank account to satisfy its customer account, but will not pay the $1,000 in funds due to the clearing member's firm account until 11 a.m. For a diagrammatic explanation of the settlement of options premiums, please refer to Exhibit A.

VII. EXERCISE AND ASSIGNMENT OF OPTIONS

When the OCC issues an option, it becomes obligated to purchase or sell the underlying security or currency for the stated exercise price (or, in the case of a stock index

option, to pay or collect the exercise settlement amount), if the option is exercised. A holder exercises an option by directing its broker to give exercise instructions to the OCC.[14] On the business day following receipt of an exercise instruction (or on the business day following expiration for expiring in-the-money stock and stock index options), the OCC randomly assigns the exercise to a clearing member account that reflects the writing of an option or options of the same series as the exercised option. The assigned clearing member then becomes obligated to perform the OCC's obligations on its behalf.

The clearing member assigns the exercised option to a customer maintaining a position as a writer of that option, either randomly or on a first-in, first-out basis consistent with each exchange's rules. Alternatively, the member itself may have written the option and be bound to perform. The customer or holder ultimately assigned to the option is required to deliver the underlying security, commodity or currency amount. However, if the customer fails to deliver the underlying interest, the assigned member firm is responsible for delivering it to the OCC. Likewise, if the assigned member fails to deliver the underlying interest to the OCC, the OCC itself is obligated to complete delivery to the customer exercising the option. For a diagrammatic explanation of the exercise and assignment of options, please refer to Exhibit B.

VIII. SETTLEMENT OF THE UNDERLYING INTEREST

Settlement of obligations among clearing members varies significantly based on the type of option exercised. The following sections describe in detail the process for delivering the underlying interest of each option cleared by the OCC.

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[14] Alternatively, the OCC has automatic execution thresholds for stock and stock index options. If a stock or stock index option is in-the-money past a certain threshold as specified by the OCC, the OCC will execute the option automatically without directions from the clearing member.

A. SETTLEMENT OF STOCK OPTIONS

For equities, settlements among brokers or their agents on exercised stock options ordinarily are handled through an interface with a securities clearing corporation, primarily the National Securities Clearing Corporation (NSCC). After an exercise of a stock option has been assigned, the OCC will report the exercise to the clearing corporation designated by the exercising and assigned clearing members for settlement purposes. Settlement then is done in the same way as for ordinary stock purchases and sales; each clearing member looks to its own clearing corporation for settlement, and receives delivery of the underlying stock, or makes payment of the exercise price, in accordance with the rules of that clearing corporation. The clearing corporation in turn looks to the other clearing member (if both clearing members designated the same clearing corporation), or to the stock clearing corporation designated by the other clearing member, for an offsetting delivery or payment. Where an exercise is settled through a stock clearing corporation, the OCC assumes no further responsibility after the opening of business on the exercise settlement date. Instead, rights and responsibilities run between clearing members and their respective clearing corporations.

Although exercises of stock options ordinarily are settled through clearing corporations, the OCC may require that particular stock option exercises be settled on a member-to-member basis. Where settlement is made directly between clearing members, the OCC's obligations are discharged when the aggregate exercise price in the case of a put, or the underlying security in the case of a call, is delivered to the exercising clearing member. An example of such unusual circumstances would be a situation where there is a shortage of the underlying stock and many open uncovered call positions. Such special circumstances may result in OCC mandating cash settlement instead of delivery of the stock.

B. SETTLEMENT OF STOCK INDEX OPTIONS

When an index option is exercised, the exercise is settled by the payment of cash, not by delivery of the stock.[15] The assigned writer is obligated to pay the exercising holder cash in an amount equal to the difference (expressed in dollars) between the closing level of the underlying index on the exercise date and the exercise price of the option, multiplied by a specified index multiplier.

Settlement between brokers or their agents and the OCC takes place on the business day immediately following the day of exercise through a cash settlement system operated by the OCC. The OCC first nets the exercise settlement amounts to be paid to the member. The resulting net cash settlement payment or receipt amount is made via the OCC's submission of instructions to the clearing banks to withdraw from or deposit into the member's bank account the net settlement amount, per account type. Payments for settlement are made to the OCC in immediately available funds by 10 a.m.; payments made to members are made in immediately available funds by 11 a.m. While settlement of stock index options occurs at the same time as the daily premium and margin settlement, the cash amount due for settlement is never netted with the cash amount due for daily margin and premiums.

C. SETTLEMENT OF TREASURY DEBT OPTIONS

Exercises of Treasury debt options are settled directly between the exercising and the assigned clearing members' banks through Fedwire. Settlement for Treasury note and bond options usually occurs on the second business day following the exercise date. Payment of the

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[15] The cash settlement feature distinguishes index options from other types of options contracts. Cash settlement of index options contracts was probably the single most important feature that delayed regulatory approval of this instrument. Opponents to these contracts argued that cash settlement was "dangerously similar to legalized gambling," since a person could bet on the stock market without taking delivery of the actual securities. Proponents successfully argued, however, that cash settlement was the only practical method that permitted these contracts to function smoothly as a legitimate hedging tool because of the near impossibility of making or taking delivery or securities as a composite index.

exercise price at settlement must be accompanied by payment of accrued interest on the underlying bond or note from, but not including, the date of issue or the last interest payment date (whichever is later) through and including the exercise date.

Exercises of Treasury bill options may be settled not only by the delivery of Treasury bills issued on the exercise settlement date but also by the delivery of previously issued Treasury bills with the same remaining maturity. For example, the exercising holder of a Treasury bill put could deliver either newly issued 13-week Treasury bills or previously issued 26-week or 52-week bills with 13 weeks remaining to maturity as of the exercise settlement date. This practice does not cause problems with DKs ("Don't Knows") because all Treasury bills with a given maturity date are homogeneous after they become W.I. ("when issued"). Therefore, the receiver cannot differentiate between a newly issued 13-week T-bill and a 26-week bill with 13 weeks remaining to maturity.

D. SETTLEMENT OF FOREIGN CURRENCY OPTIONS

Settlement of foreign currency options involves the delivery of both U.S. dollars and a foreign currency amount. Payment of U.S. dollars generally is made in the U.S. through U.S. banks. Payment of foreign currency amounts is made by the clearing member through a bank in the country of the currency being delivered.

Settlement of foreign currency options usually occurs four business days after exercise.

[16] The time of day that settlement occurs varies with the currency being settled. The foreign currency transfer is made during the business hours of the home country of the currency, (which means either before the U.S. market opens or early in the morning U.S. time). The dollar

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[16] Options expiring on Saturday, however, settle on the following Wednesday, not Thursday which is actually the fourth business day after Saturday.

amount is transferred in the afternoon U.S. time, after the transfer of the foreign currency has been confirmed.

The day after an option is exercised, the assigned clearing member will receive notification through the OCC's "Foreign Exchange Exercise and Assignment Report". At expiration, a clearing member may elect to net U.S. dollar and foreign currency amounts due to the OCC with offsetting futures positions obligations at the OCC's futures-clearing subsidiary, the Intermarket Clearing Corporation.

Normally, the clearing member that owes the U.S. dollar amount will be debited by the OCC through its domestic banking facilities two business days after exercise.[17] The clearing member owing the foreign currency amount, however, is given until settlement day to deliver its obligation to the OCC. The foreign currency must be delivered to the OCC's designated settlement bank in the country of the currency. On settlement day, the OCC receives the foreign currency amount and then re-transfers that amount to the appropriate clearing member. Finally, the OCC credits the U.S. dollar settlement amount to the clearing member that delivered the foreign currency.

There are two methods for settling both U.S. dollar and foreign currency amounts: "regular way" settlement and delivery versus payment (DVP) settlement.[18] The main differences between the two types of settlement deal with timing and where the credit risk ultimately falls, as described below.

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[17] An exception to this is the OCC's delivery versus payments system which allows the substitution of a guarantee of payment from a bank for the cash itself on the second day after expiration.

[18] When DVP settlement is used to settle foreign currency amounts, it is referred to as "reverse" DVP settlement since DVP was originally designed to facilitate the delivery of U.S. dollar amounts.

1. REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY AMOUNTS

There are three ways to effect regular way settlement of foreign currency settlement amounts: through wire transfer at one of the OCC's designated foreign exchange agent banks; through a clearing member's foreign currency settlement bank[19] in the country of origin of the currency; or through a clearing member's agent bank which has a branch or correspondent bank in the country of origin of the currency.

The first type of regular way settlement is through wire transfer at one of the OCC's designated foreign currency agent banks. This method can be used only by clearing members that maintain multicurrency accounts at one of the OCC's agent banks. Transfer is made when the clearing member instructs the OCC's agent bank to transfer a foreign currency amount from its account at the agent bank to the OCC's account at the same bank. For example, if a clearing member maintained a Japanese yen account at the Bank of America[20] and owed the OCC a specified amount of Japanese yen, the clearing member could notify the Bank of America - London (the OCC's designated agent bank for Japanese yen transactions) to effect book entry transfer from its yen account at the Bank of America to the OCC's account at that same bank. The actual transfer would occur via the Microwire wire transfer service provided by the Bank of America. The transfer would occur only if BOA-London (acting as the agent bank) found that the terms of the instructions from the clearing member matched those of a prenotification message sent by the OCC. This process is shown in Exhibit C.

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[19] Although the OCC calls these banks "settlement" banks, they are actually used only for delivery and receipt of the foreign currency.

[20] Note that all of the OCC's agent banks operate in a similar manner.

The second type of regular way settlement[21] is through instructions sent by a clearing member to a foreign currency settlement bank in the country of origin of the currency. The actual steps taken in this type of transaction are dependent on the currency being transferred because certain OCC foreign exchange agent banks require notification of the intent (either on the first or second business day after exercise) to transfer the currency before they will effect the transaction.

Clearing members instruct their settlement banks to transfer the currency to the OCC's account at its designated foreign currency settlement bank in the country of origin. Transfer between the clearing member's settlement bank and the OCC's settlement bank is effected on settlement day. The OCC's settlement bank is either a branch or correspondent of

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[21] The differences among settlement banks, agent banks, foreign currency agent banks, and foreign currency settlement banks is crucial to understand the last two types of regular way settlement procedures.

Clearing members designate one bank in the U.S. to settle their U.S. dollar transactions. This bank is called the settlement bank, and it agrees to honor OCC instructions to debit and credit the member firm's account for settlement purposes. These banks may act as an agent bank (defined below) for a clearing member, but they do not effect foreign currency transfers since multicurrency accounts are discouraged in the U.S.

A clearing member's agent bank is basically a conduit for instructions from the clearing member to the agent bank's branch or correspondent in a foreign country. An agent bank does not effect foreign currency funds transfer for a clearing member, rather it instructs its branch or correspondent to effect foreign currency funds transfer on behalf of the clearing member. For example, a clearing member may use Chemical Bank in New York as an agent bank to instruct Chemical's London branch to transfer British pounds to the OCC's account at the Bank of America - London, the OCC's foreign currency settlement bank (defined below) for sterling.

The OCC's foreign currency agent banks perform a different function than the clearing member's agent banks. When the OCC designates a bank as an agent bank for a specific foreign currency, it means that the OCC actually holds its accounts for that currency at that bank (although it may take delivery of that currency at another bank). Foreign currency agent banks do not effect funds transfer for the OCC unless they are also designated as a foreign currency settlement bank (see below).

Finally, there are foreign currency settlement banks. Both the OCC and the clearing members designate foreign currency settlement banks (also called foreign currency delivery banks) for each type of currency options traded. Foreign currency settlement banks transfer and take delivery of non-U.S. dollar currencies on behalf of the OCC and/or clearing members. (Although OCC foreign currency settlement banks take delivery of currency for the OCC, they do not maintain accounts for the OCC unless they also designated as its foreign currency agent bank).

the OCC's designated agent bank for that currency.[22] Detailed diagrams of this procedure are given in Exhibits D, E and F.

The last type of regular way transfer is similar to the second type except that the clearing member delivers its instructions to an agent bank in the United States which is either a branch or correspondent of a settlement bank in the country of origin of the currency. The member's agent sends the transfer instructions to the OCC's settlement bank and prenotifies the agent bank, when appropriate. The settlement bank in the country of the currency makes the actual transfer on settlement day, as above. Although one might expect that this type of transfer would lead to more timely delivery of funds due to the implicit substitution of the banking relationship in the middle of the transaction, this is apparently not so. For example, when a clearing member deals directly with a settlement bank in the country of origin of the currency, the settlement bank usually receives the settlement instructions no later than the second day after exercise. However, when a clearing member uses an agent bank to convey the settlement instructions, the settlement bank does not usually receive the settlement instructions until the third day after exercise. In effect, using an agent bank merely adds a step (and therefore a delay) to the process. This type of transfer is diagramed in Exhibits G, H and I.

2. REGULAR WAY SETTLEMENT OF U.S. DOLLAR AMOUNTS

With regular way settlement of U.S. dollar amounts, the clearing member is debited by the OCC two business days after the option is exercised. The settlement amount is debited through regular OCC domestic banking facilities, where the OCC presents the clearing member's settlement bank with debit instructions. By requiring funds to be delivered two days prior to settlement day, the OCC protects itself from the possibility of a clearing member default

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[22] Alternatively, the OCC's agent bank may be both the agent bank and the settlement bank for a particular currency. In this case, the agent bank would receive foreign currency for the OCC, but would be doing so in its role as settlement bank.

in the interim. For a diagrammatic explanation of regular way settlement of U.S. dollar amounts, please refer to Exhibit J.

3. DELIVERY VERSUS PAYMENT SETTLEMENT

The delivery versus payment method of settling foreign currency options was designed for payments of U.S. dollars against receipt of foreign currency, but it now also is used in "reverse" for delivery of U.S. dollars against payment of foreign currency. DVP settlement was created because some clearing members disliked the two day prepayment requirement for U.S. dollar amounts.

With DVP settlement of foreign currency options, the member firm's settlement bank[23] guarantees payment of a U.S. dollar (or foreign currency) amount two days prior to settlement. Once this guarantee has been received, the OCC's agent bank guarantees that the counter-currency will be delivered to the DVP bank on settlement day. This method replaces the credit risk of the member firm with that of its DVP settlement bank, and the credit risk of the OCC with that of its agent bank (i.e., the transaction becomes an interbank risk between the DVP bank and agent bank).

To enact a DVP settlement, a clearing member must submit a DVP authorization form to the OCC by 1 p.m. on the first day after exercise. The OCC will approve and sign the form provided that the bank that the clearing member has elected to use is an "approved DVP settlement bank" (as designated by the OCC's agent bank) and that the transaction is within the credit limit for that particular DVP bank. The OCC returns the signed form to the clearing member which then passes the instructions on to its DVP bank.

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[23] For payment of U.S. dollars, a domestic DVP bank is used. For payment of a foreign currency amount, a foreign DVP bank is used.

DVP settlement banks have an agreement with the OCC's foreign exchange agent banks stating that SWIFT MT-100 messages confirming DVP settlement are irrevocable bank-to-bank commitments. This means that once an OCC agent bank confirms the payment of the counter-currency via a SWIFT MT-100, the DVP bank is legally bound to deliver the funds to the OCC's designated settlement bank on settlement day regardless of whether the clearing member fulfills its obligations. Likewise, the OCC agent bank is legally bound to fulfill its part of the transaction on settlement day regardless of the performance of the OCC. The OCC agent bank will release a DVP bank of its obligations only if the terms of the DVP bank's MT-100 message do not match those of the pre-advice sent by the OCC. In this case, the OCC would revert back to regular way settlement.

Since the banks assume a large part of the credit risk of the transaction from the clearing member and the OCC, they charge a fee based on that risk. The fee charged by the OCC agent bank is based on the credit risk of the DVP bank used and the amount of exposure. This fee is passed onto the clearing member that uses DVP settlement. In addition to the OCC agent bank's fee, a fee from the DVP bank also would likely be charged to the clearing member. For a diagram of this process, please refer to Exhibit K.

4. A COMPARISON OF THE RISKS OF REGULAR WAY VERSUS DELIVERY VERSUS PAYMENTS SETTLEMENT

One difference in risk between the two basic types of foreign currency options settlement is the difference in temporal risk. With regular way settlement of foreign currency options, the clearing member that owes the dollar amount is required to pay its obligation to the OCC two days prior to settlement, while its counterparty is not obligated to pay the OCC until settlement day. Once a clearing member using regular way settlement pays the U.S. dollar amount, the OCC is no longer exposed to the risk that that clearing member might default. However, since the OCC is still exposed to the clearing member owing the foreign currency

amount, the clearing member that paid the U.S. dollar amount is now exposed to the risk that the OCC might experience a liquidity problem due to the default of the counterparty, thus resulting in a delay in the payment of the foreign currency.

Another difference between the two types of foreign currency options settlement deals with where the credit risk falls. With regular way settlement of foreign currency options, the OCC is directly exposed to the credit risk of the members involved in the settlement. Likewise, those members are exposed to the credit risk of the OCC. With delivery versus payments settlement, on the other hand, the OCC's agent bank assumes the risk for the OCC and the member's DVP settlement bank assumes the credit risk for the member. Thus the transaction is reduced to an interbank risk between the OCC agent bank and the member's DVP settlement bank.

IX. AN EXAMINATION OF RISKS AT THE OCC

With an organization as complex as the OCC, one cannot expect risk to be eliminated. The relevant concern, then, is to identify those areas where risk can be reduced and/or safeguards improved. During the October 1987 market break, the OCC's safeguards were put on trial as risks soared with the volatility in the markets. The OCC survived that week despite the failure of one clearing member, H.B. Shaine and Co. That failure, however, cost the OCC's clearing members $6.8 million in the form of a pro rata charge to the clearing fund (representing 2.45 percent of the total clearing fund). Concern remains about how well the OCC would have fared had more than one clearing member defaulted during the week of October 19, 1987.

One area of concern is participants' liquidity, especially when options are used to offset risks taken in other markets. Because no widespread system of cross-margining yet

exists, liquidity problems can occur when clearing members are required to post margin for their positions in all markets, regardless of whether the risk of a position in one market is offset by a position in another market. The risk of a major intermarket liquidity problem is of great concern.

Cross-margining of positions cleared through one legal entity (such as options through the OCC and futures through the Intermarket Clearing Corporation, a subsidiary of the OCC) is one solution which might be more easily implemented than some other solutions.[24] Cross-margining of positions cleared through two legal entities (such as index options cleared through the OCC and index futures cleared through the Chicago Mercantile's clearing corporation) also is a potential solution, albeit more complex.[25] For example, it is not clear which organization should hold the margin and how that margin would be split in the case of a default.

At this point, the discussion surrounding cross-margining usually focuses on proprietary accounts (i.e., accounts that hold the trades of the clearing member firms themselves). However, when the discussion is broadened to include the customers of clearing members, the question of who holds the margin and how losses will be absorbed becomes more complex. For example, when two clearinghouses decide to cross-margin positions, it is up to those two clearinghouses to decide who holds the margin and how any losses would be split. If cross-margining were to be permitted at the customer level, then potentially all clearing member firms from both clearinghouses would have to agree on how to calculate margin, who

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[24] In fact, the SEC and CFTC recently approved a proposal that allows the cross-margining of offsetting positions held at the OCC and ICC. The system is currently available for proprietary accounts of joint OCC/ICC clearing members.

[25] The OCC and the CME have submitted proposals to the SEC and CFTC requesting cross-margining for certain of their stock index options.

would hold the margin, and how losses would be split in the case of a default.[26] The benefits of cross-margining should be viewed in light of any additional risks it may introduce.

Another area of potential risk at the OCC is what constitutes finality for various parties. Presently, the OCC's transactions are "final" once the payment is received (or once the transfer is entered into a system such as Fedwire). From the OCC's viewpoint, payments are "final" once they are confirmed by the banks at 9:45 a.m. (The actual payment is not due until 10:00 a.m.) However, as demonstrated during the week of October 19, 1987, this compressed timeframe does not leave much room to make informed credit decisions. During that week, many payments confirmations were delayed as banks tried to get information on the current status of their customers. This caused a chain reaction where the payments to the OCC were received late which, in turn, caused payments from the OCC also to be delayed, with spillover effects in other markets.

The OCC is exploring the possibility of establishing a banking facility which would allow it to pay out its obligations to clearing members regardless of whether payments into the system have arrived on time. As with the cross-margining proposals, the new risks introduced by such a change may outweigh its benefits. In this case, the change would shift the risk from the clearing members and their settlement banks to the OCC and its banks.

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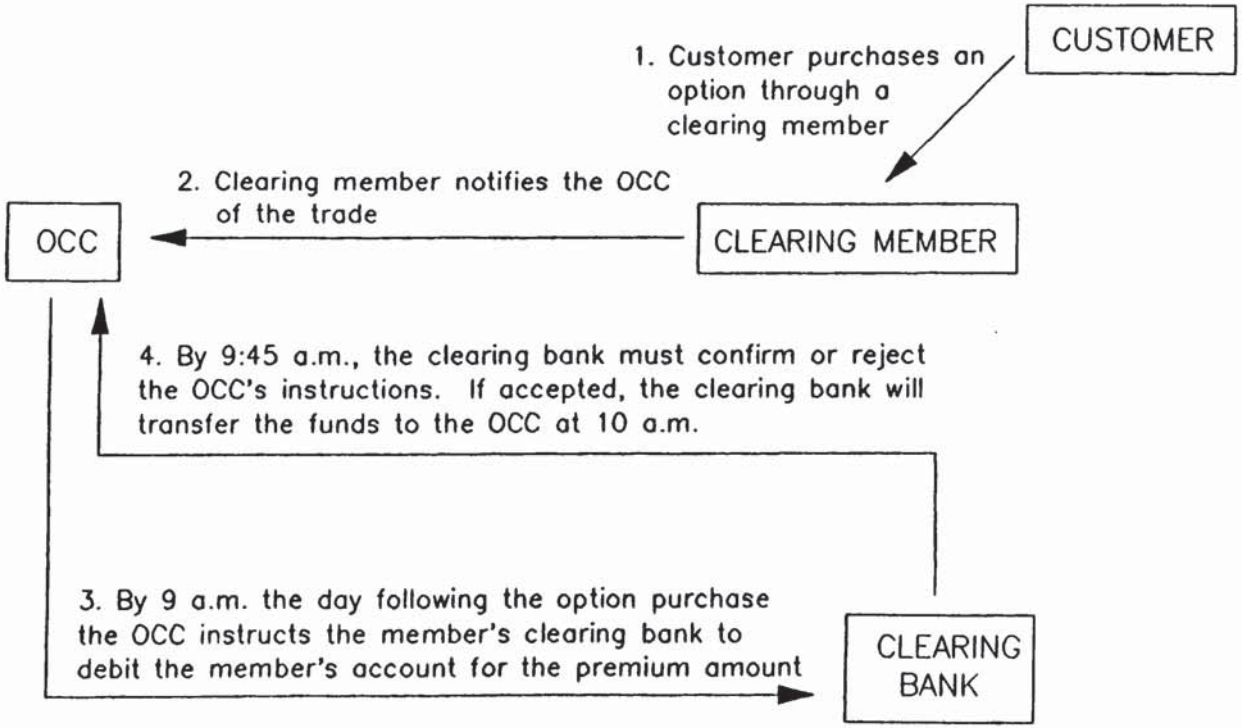
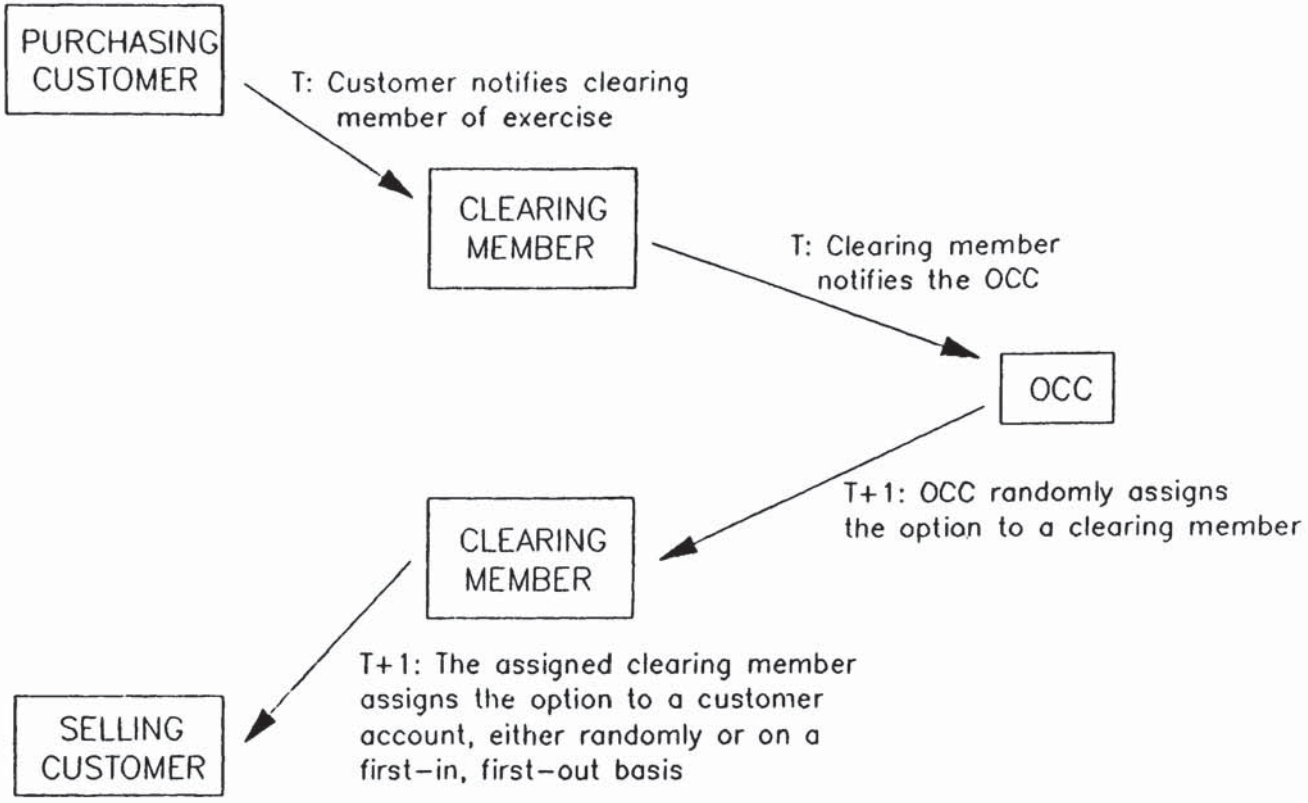
[26] Clearing member firms post margin to clearinghouses on behalf of their customers, and hold the customer's margin themselves. A clearing member may charge a higher margin to its customers than it is charged by the clearinghouse. Since individual clearing members decide what to charge their customers, it is likely that the policies are not uniform.

EXHIBIT A

SETTLEMENT OF OPTION PREMIUMS


CUSTOMER
1. Customer purchases an option through a clearing member
2. Clearing member notifies the OCC of the trade
OCC
CLEARING MEMBER
4. By 9:45 a.m., the clearing bank must confirm or reject the OCC's instructions. If accepted, the clearing bank will transfer the funds to the OCC at 10 a.m.
3. By 9 a.m. the day following the option purchase the OCC instructs the member's clearing bank to debit the member's account for the premium amount
CLEARING BANK

EXERCISE AND ASSIGNMENT OF OPTIONS


PURCHASING CUSTOMER
T: Customer notifies clearing member of exercise
CLEARING MEMBER
T: Clearing member notifies the OCC
OCC
T+1: OCC randomly assigns the option to a clearing member
CLEARING MEMBER
T+1: The assigned clearing member assigns the option to a customer account, either randomly or on a first-in, first-out basis
SELLING CUSTOMER

Note: The letter "T" refers to the date an option is exercised.
"T+1" refers to the first business day after exercise, etc.

EXHIBIT C

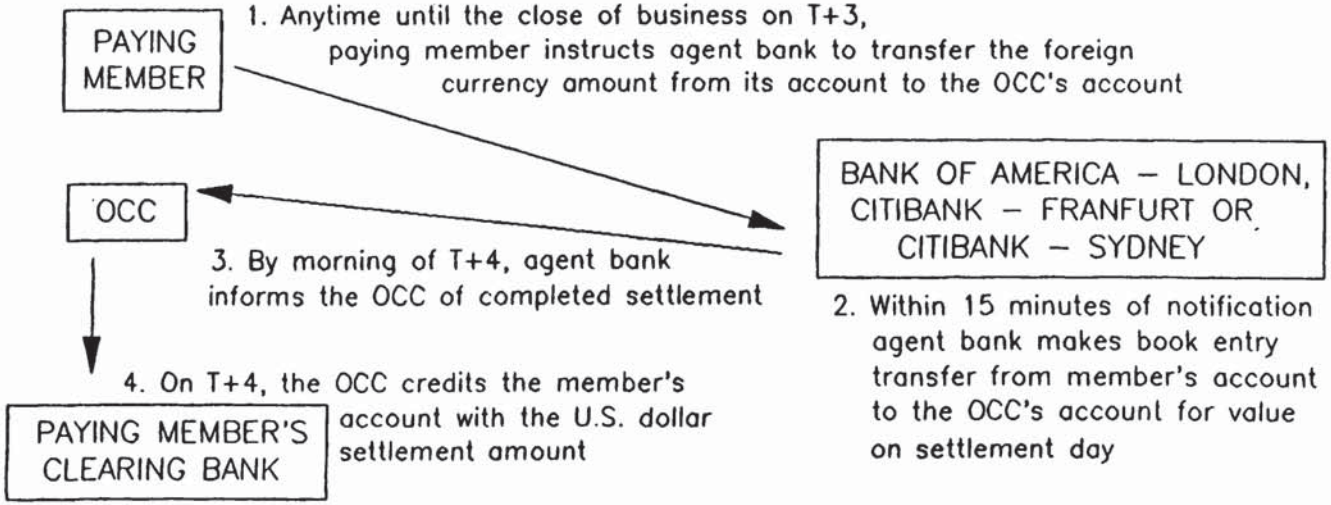
REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY OPTIONS

SETTLEMENT OF FOREIGN CURRENCY AMOUNTS

- holder exercising put option
- writer assigned to call option

TRANSFER TYPE 1

- money transfer using service provided by OCC agent bank (i.e., Bank of America's Microwire or Citibank's CITIACCESS)


PAYING MEMBER
1. Anytime until the close of business on T+3, paying member instructs agent bank to transfer the foreign currency amount from its account to the OCC's account
BANK OF AMERICA – LONDON, CITIBANK – FRANFURT OR CITIBANK – SYDNEY
OCC
3. By morning of T+4, agent bank informs the OCC of completed settlement
2. Within 15 minutes of notification agent bank makes book entry transfer from member's account to the OCC's account for value on settlement day
4. On T+4, the OCC credits the member's account with the U.S. dollar settlement amount
PAYING MEMBER'S CLEARING BANK

Note: This type of settlement is usually used by clearing members that maintain multicurrency accounts at an OCC foreign exchange agent bank

REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY OPTIONS

SETTLEMENT OF DEUTSCHE MARKS AND AUSTRALIAN DOLLARS

- holder exercising a put option
- writer assigned to a call option

TRANSFER TYPE 2

- clearing member to a settlement bank in the country of origin

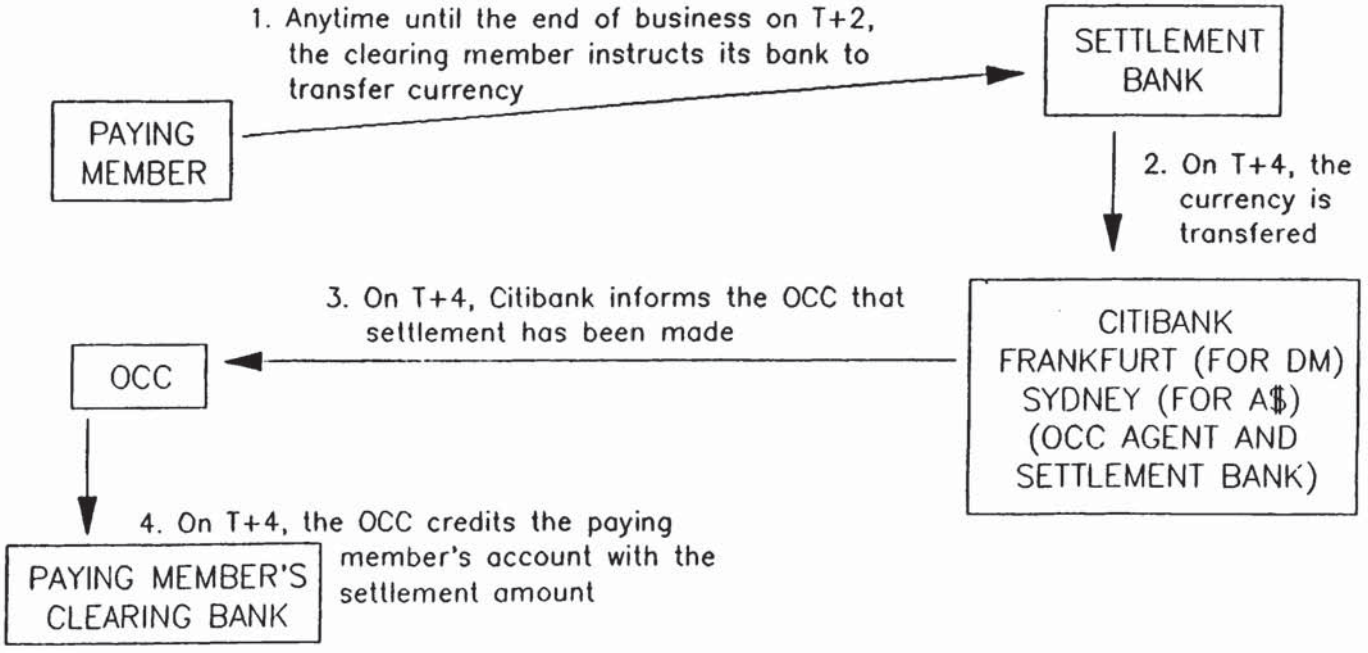

1. Anytime until the end of business on T+2, the clearing member instructs its bank to transfer currency
PAYING MEMBER
SETTLEMENT BANK
2. On T+4, the currency is transfered
CITIBANK FRANKFURT (FOR DM) SYDNEY (FOR A$) (OCC AGENT AND SETTLEMENT BANK)
3. On T+4, Citibank informs the OCC that settlement has been made
OCC
4. On T+4, the OCC credits the paying member's account with the settlement amount
PAYING MEMBER'S CLEARING BANK

EXHIBIT E

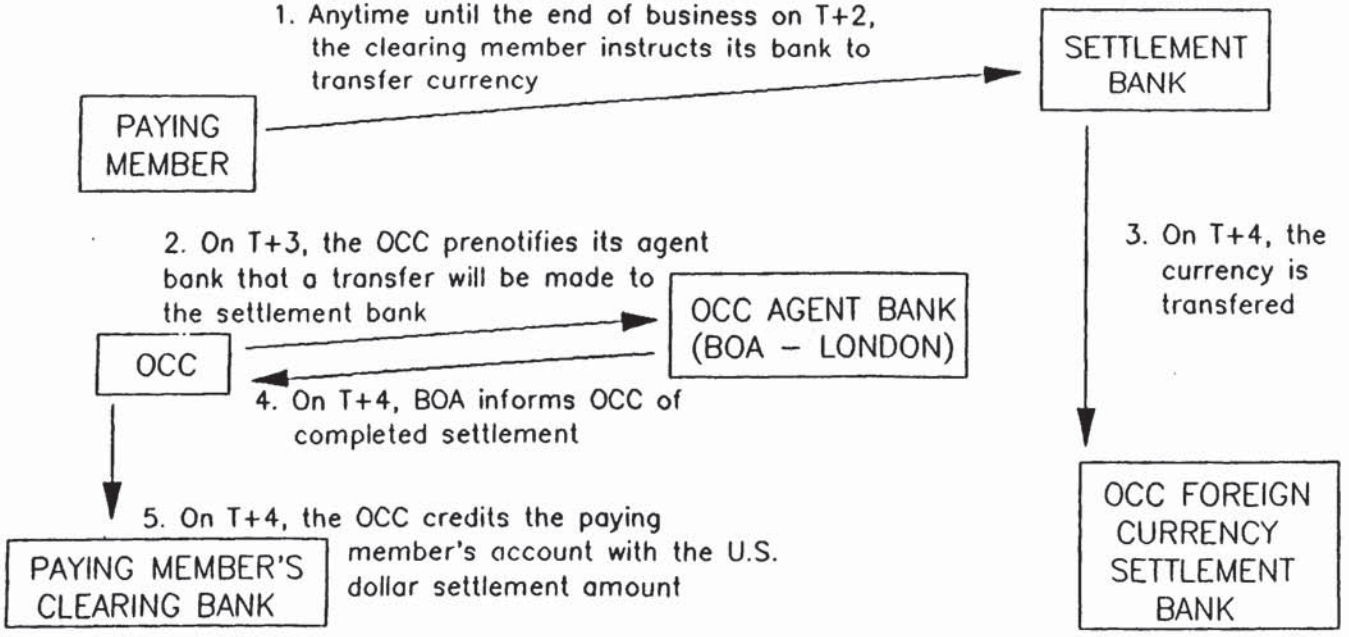
REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY OPTIONS

SETTLEMENT OF BRITISH POUNDS, JAPANESE YEN AND FRENCH FRANCS

- holder exercising a put option
- writer assigned to a call option

TRANSFER TYPE 2

- clearing member to a settlement bank in the country of origin


1. Anytime until the end of business on T+2, the clearing member instructs its bank to transfer currency
PAYING MEMBER
SETTLEMENT BANK
2. On T+3, the OCC prenotifies its agent bank that a transfer will be made to the settlement bank
OCC
OCC AGENT BANK (BOA – LONDON)
4. On T+4, BOA informs OCC of completed settlement
3. On T+4, the currency is transfered
5. On T+4, the OCC credits the paying member's account with the U.S. dollar settlement amount
PAYING MEMBER'S CLEARING BANK
OCC FOREIGN CURRENCY SETTLEMENT BANK

REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY OPTIONS

SETTLEMENT OF CANADIAN DOLLARS, SWISS FRANCS AND EUROPEAN CURRENCY UNITS

- holder exercising a put option
- writer assigned to a call option

TRANSFER TYPE 2

- clearing member to a settlement bank in the country of origin

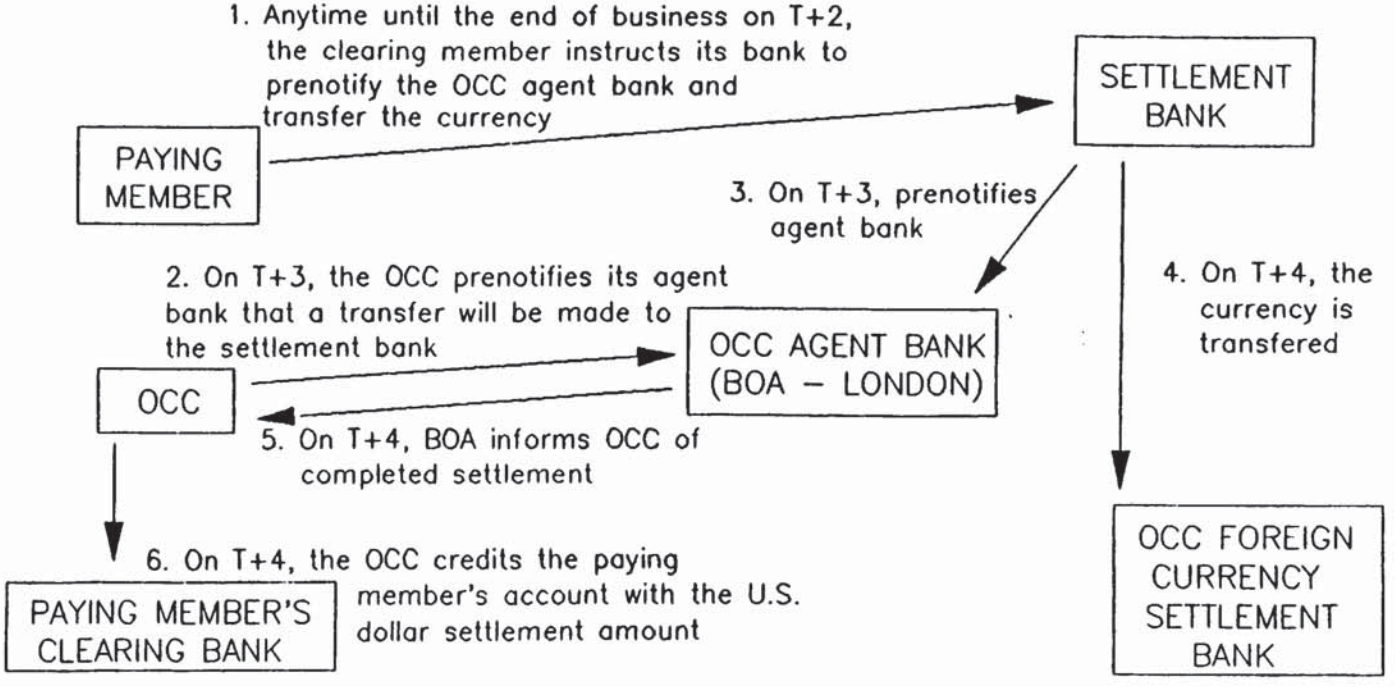

1. Anytime until the end of business on T+2, the clearing member instructs its bank to prenotify the OCC agent bank and transfer the currency
PAYING MEMBER
SETTLEMENT BANK
3. On T+3, prenotifies agent bank
2. On T+3, the OCC prenotifies its agent bank that a transfer will be made to the settlement bank
OCC AGENT BANK (BOA – LONDON)
OCC
4. On T+4, the currency is transfered
5. On T+4, BOA informs OCC of completed settlement
6. On T+4, the OCC credits the paying member's account with the U.S. dollar settlement amount
PAYING MEMBER'S CLEARING BANK
OCC FOREIGN CURRENCY SETTLEMENT BANK

EXHIBIT G

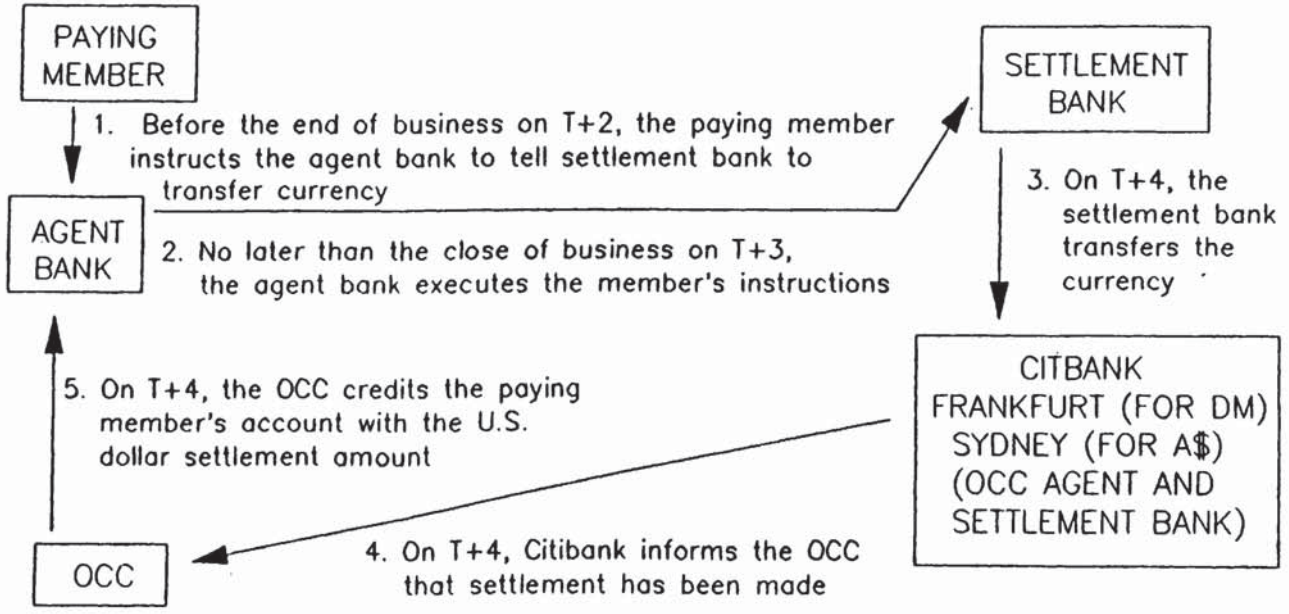
REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY OPTIONS

SETTLEMENT OF DEUTSCH MARKS AND AUSTRALIAN DOLLARS

- holder exercising a put option
- writer assigned to a call option

TRANSFER TYPE 3

- clearing member to agent bank to branch/correspondent which is a settlement bank in the country of origin


PAYING MEMBER
1. Before the end of business on T+2, the paying member instructs the agent bank to tell settlement bank to transfer currency
SETTLEMENT BANK
AGENT BANK
2. No later than the close of business on T+3, the agent bank executes the member's instructions
3. On T+4, the settlement bank transfers the currency
CITBANK FRANKFURT (FOR DM) SYDNEY (FOR A$) (OCC AGENT AND SETTLEMENT BANK)
5. On T+4, the OCC credits the paying member's account with the U.S. dollar settlement amount
4. On T+4, Citibank informs the OCC that settlement has been made
OCC

REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY OPTIONS

SETTLEMENT OF BRITISH POUNDS, JAPANESE YEN AND FRENCH FRANCS

- holder exercising a put option
- writer assigned to a call option

TRANSFER TYPE 3

- clearing member to agent bank to branch/correspondent which is a settlement bank in the country of origin

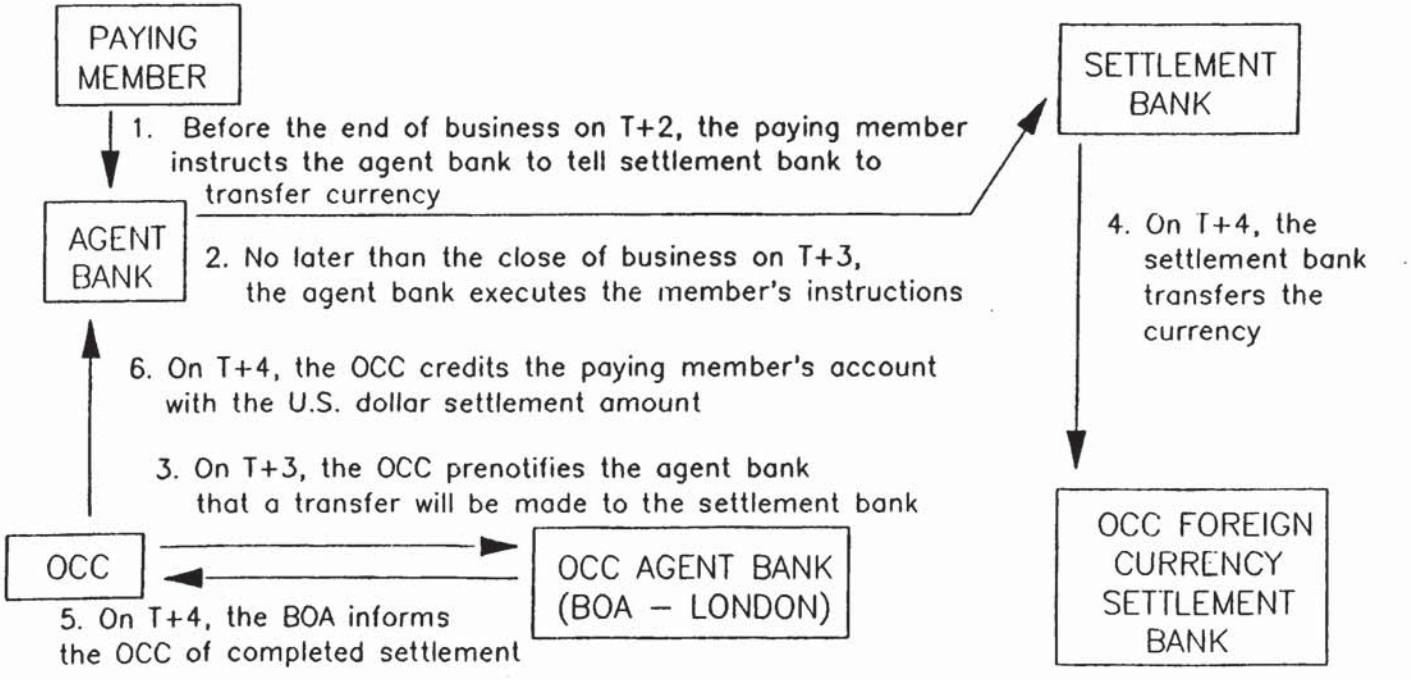

PAYING MEMBER
1. Before the end of business on T+2, the paying member instructs the agent bank to tell settlement bank to transfer currency
SETTLEMENT BANK
AGENT BANK
2. No later than the close of business on T+3, the agent bank executes the member's instructions
4. On T+4, the settlement bank transfers the currency
6. On T+4, the OCC credits the paying member's account with the U.S. dollar settlement amount
3. On T+3, the OCC prenotifies the agent bank that a transfer will be made to the settlement bank
OCC
OCC AGENT BANK (BOA – LONDON)
OCC FOREIGN CURRENCY SETTLEMENT BANK
5. On T+4, the BOA informs the OCC of completed settlement

EXHIBIT I

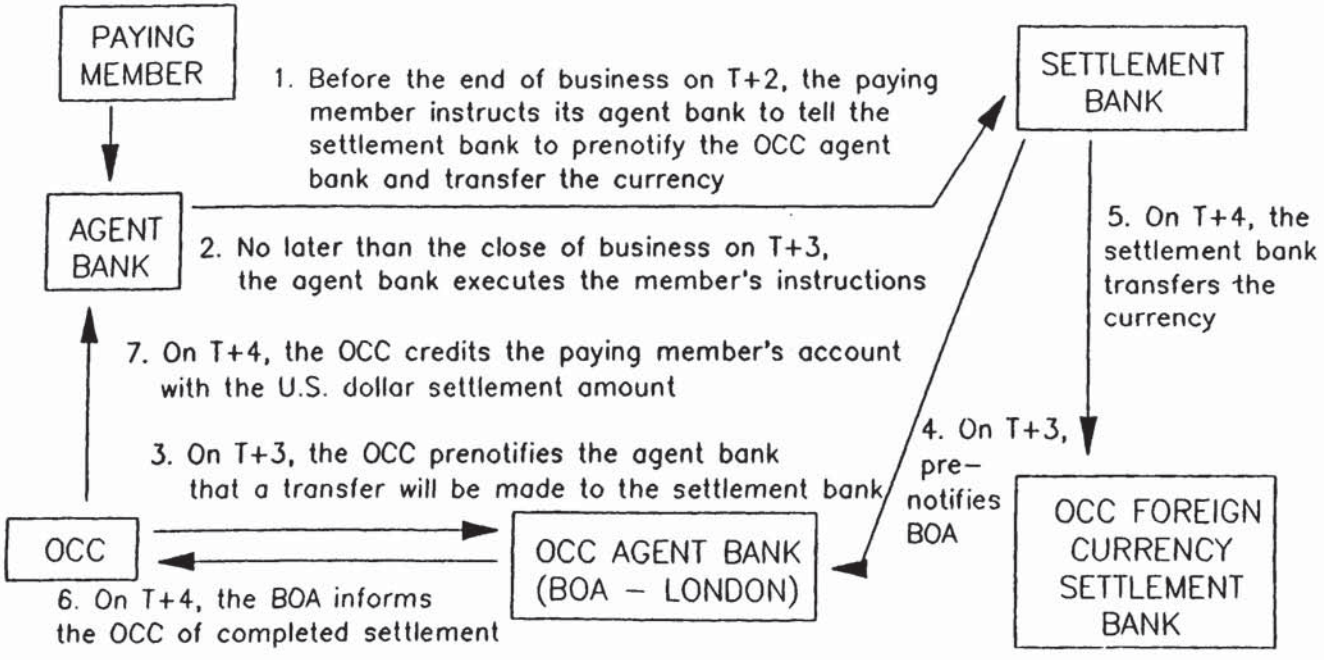
REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY OPTIONS

SETTLEMENT OF CANADIAN DOLLARS, SWISS FRANCS AND EUROPEAN CURRENCY UNITS

- holder exercising a put option
- writer assigned to a call option

TRANSFER TYPE 3

- clearing member to agent bank to branch/correspondent which is a settlement bank in the country of origin


PAYING MEMBER
1. Before the end of business on T+2, the paying member instructs its agent bank to tell the settlement bank to prenotify the OCC agent bank and transfer the currency
SETTLEMENT BANK
AGENT BANK
2. No later than the close of business on T+3, the agent bank executes the member's instructions
5. On T+4, the settlement bank transfers the currency
7. On T+4, the OCC credits the paying member's account with the U.S. dollar settlement amount
3. On T+3, the OCC prenotifies the agent bank that a transfer will be made to the settlement bank
4. On T+3, pre-notifies BOA
OCC
OCC AGENT BANK (BOA – LONDON)
OCC FOREIGN CURRENCY SETTLEMENT BANK
6. On T+4, the BOA informs the OCC of completed settlement

REGULAR WAY SETTLEMENT OF FOREIGN CURRENCY OPTIONS

SETTLEMENT OF U.S. DOLLAR AMOUNTS

- holder exercising a call option
- writer assigned to a put option

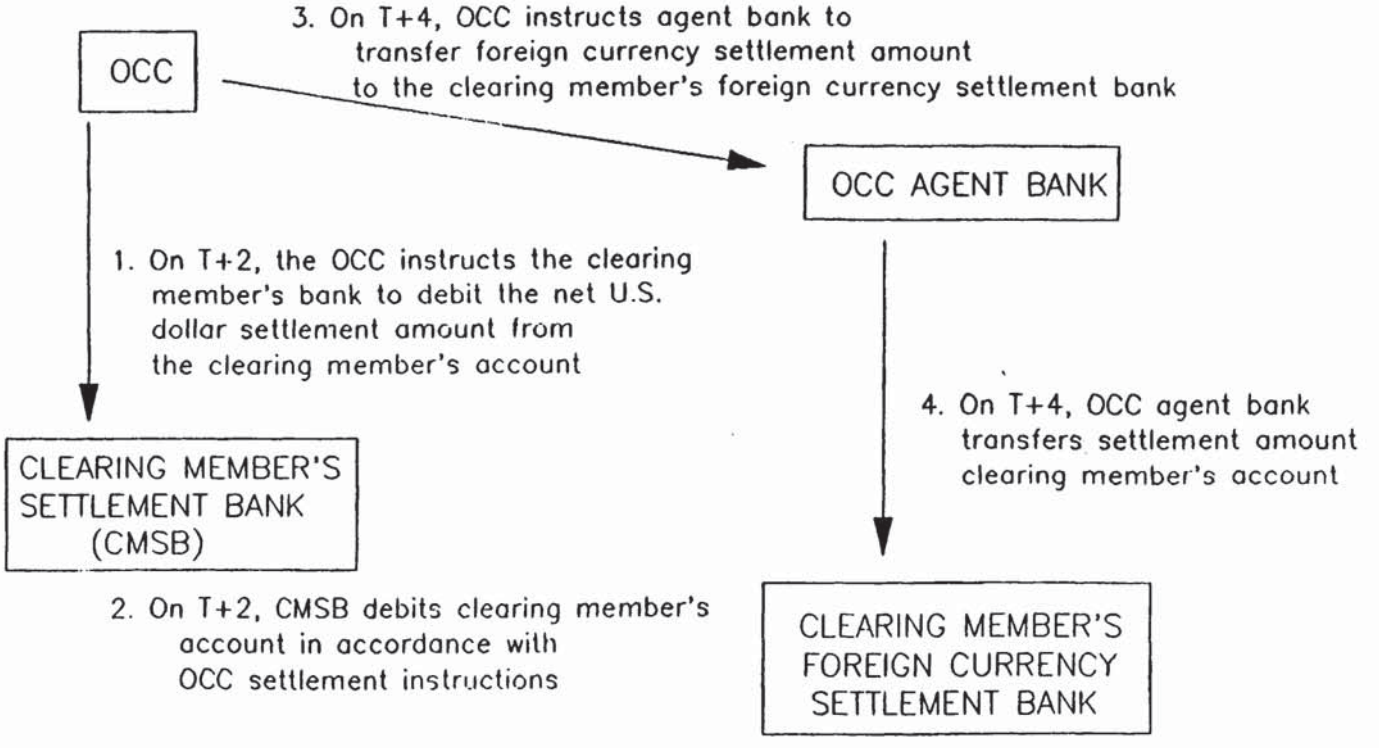
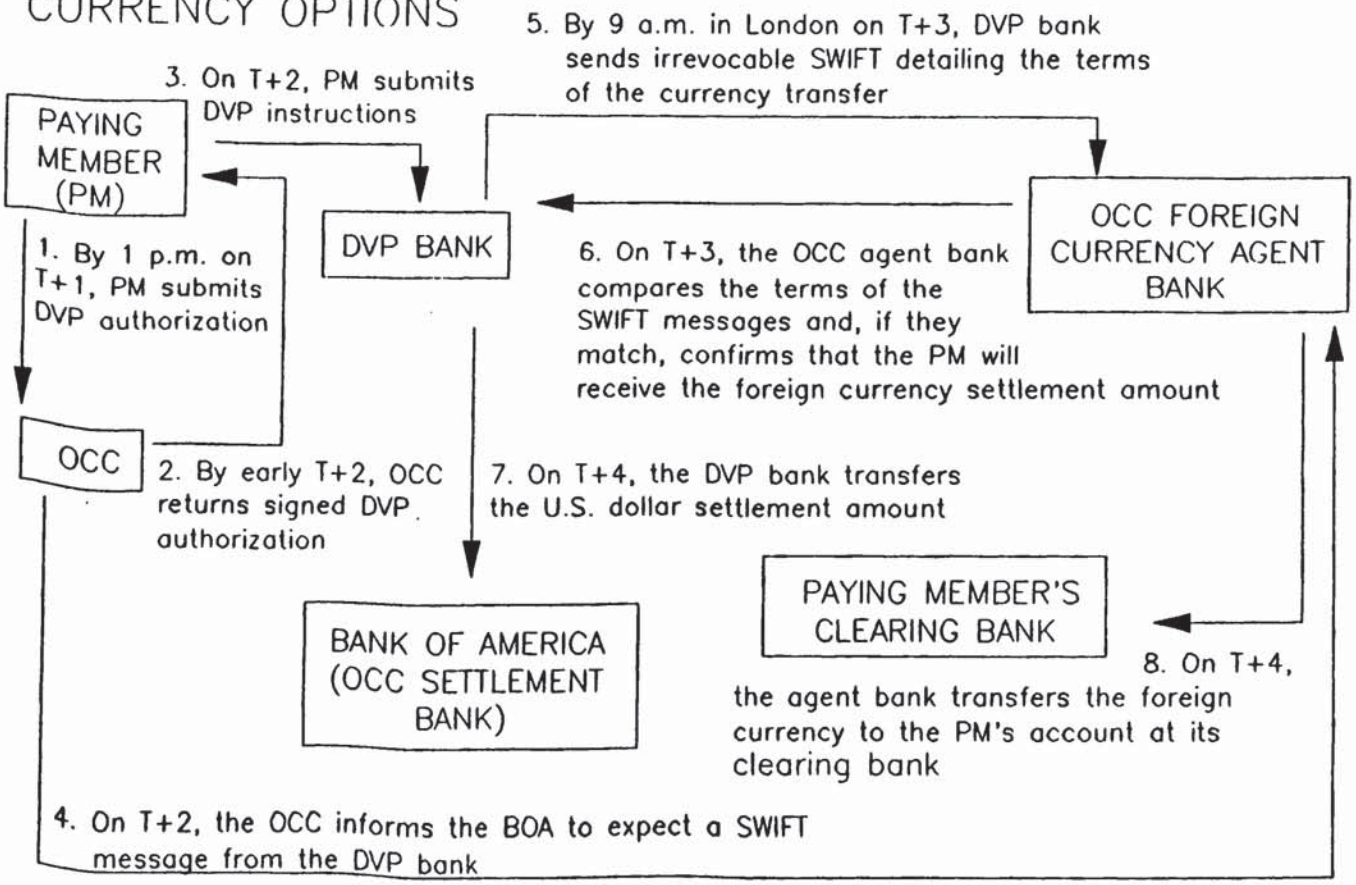

OCC
3. On T+4, OCC instructs agent bank to transfer foreign currency settlement amount to the clearing member's foreign currency settlement bank
OCC AGENT BANK
1. On T+2, the OCC instructs the clearing member's bank to debit the net U.S. dollar settlement amount from the clearing member's account
4. On T+4, OCC agent bank transfers settlement amount clearing member's account
CLEARING MEMBER'S SETTLEMENT BANK (CMSB)
2. On T+2, CMSB debits clearing member's account in accordance with OCC settlement instructions
CLEARING MEMBER'S FOREIGN CURRENCY SETTLEMENT BANK

EXHIBIT K

DELIVERY VERSUS PAYMENT SETTLEMENT OF FOREIGN CURRENCY OPTIONS


PAYING MEMBER (PM)
3. On T+2, PM submits DVP instructions
5. By 9 a.m. in London on T+3, DVP bank sends irrevocable SWIFT detailing the terms of the currency transfer
OCC FOREIGN CURRENCY AGENT BANK
DVP BANK
1. By 1 p.m. on T+1, PM submits DVP authorization
6. On T+3, the OCC agent bank compares the terms of the SWIFT messages and, if they match, confirms that the PM will receive the foreign currency settlement amount
OCC
2. By early T+2, OCC returns signed DVP authorization
7. On T+4, the DVP bank transfers the U.S. dollar settlement amount
PAYING MEMBER'S CLEARING BANK
BANK OF AMERICA (OCC SETTLEMENT BANK)
8. On T+4, the agent bank transfers the foreign currency to the PM's account at its clearing bank
4. On T+2, the OCC informs the BOA to expect a SWIFT message from the DVP bank

Clearing and Settlement
Through The
Board of Trade Clearing Corporation

History of Clearing on the Board of Trade

The Board of Trade of the City of Chicago, chartered by the Illinois legislature in 1859, is the oldest and largest commodities exchange in the United States. In the early 1840s grain traders met on Chicago's South Water Street to trade warehouse receipts for grain. The establishment of the Board of Trade provided hedgers and speculators a central marketplace for the purchase and sale of contracts for future delivery of goods. Typically contracts were closed out by purchasing or selling offsetting contracts prior to contract delivery dates.

Because gains or losses could be determined at the time an offsetting contract is purchased or sold, immediate settlement of contract price differences was demanded by customers using the exchange. Customer positions with their brokers, however, rarely matched the brokers position with other brokers. Brokers who settled gains with customers prior to receiving settlement from other brokers were in the position of extending credit, and could quickly lose their capital. Brokers needed a mechanism to settle profits, losses, and withdrawal of margin deposits among themselves, concurrent with customer settlement.

Brokers very early arranged a system of mutual cancellation of offsetting contracts among themselves called "ringing." A ring is formed by all brokers who have been buyers and sellers to one another in the same contract. Each broker nets out the quantity of a futures contract with each other broker and ascertains the ultimate difference of profit or loss to be settled on those contracts. For example, A sells a quantity of grain for future delivery to B, who sells the same to C, who sells it back to A. Because the obligations of each to buy the grain is offset by an equivalent contract to sell the grain, no delivery by anyone in the ring is actually required. Then the ring composed of A, B and C can settle their obligations by merely paying each other the price differences between the contracts purchased and sold.

To simplify the process and reduce the amount of banking required, a central clearing fund was established. A settlement price was set for all brokers in the ring for a particular contract. Each broker then paid into or drew from the common fund the amount of his profit or loss on the purchase or sale of his contracts as compared with the settlement price. This reduced each broker's banking needs from settlement with all other brokers to merely one settlement with the clearing fund.

The ring system, however, did not permit settlement where contract positions did not perfectly offset each other among ring members. This required a transfer of obligations among brokers, with a settlement of any price differences by the broker whose obligations are transferred. For example, if A sold to B who sold to C, then B, whose contracts offset each other, should be able to settle his positions. A ring system will not allow settlement because A and C have not closed out their positions. If A and C voluntarily agree to accept each other as counterparties, and B agrees to pay any price adjustment required by the substitution, then the positions may be offset.

Strange though it seems today, the legality of clearinghouses was frequently attacked, as was the trading of futures contracts generally. The most common argument was that the cancellation of purchases against sales and the payment of price differences created illegal contracts for differences, a form of gambling. The issue was finally settled by Justice Holmes in Chicago Board of Trade v. Christie G. & S. Co. in 1905,[1] in which the Court decided that the contracts offset by clearinghouses were not differences because each was enforceable for delivery against the opposite party:

> The sales in the pits are not pretended, but, as we have said, are meant and supposed to be binding. A set-off is, in legal effect, a delivery. . . . The fact that they can be and are set off sufficiently explains the possibility [of settling many more contracts for delivery than grain exists to satisfy], which is no more

[1] 198 U.S. 236 (1905).

> wonderful than the enormous disproportion between the currency of the country and contracts for payment of money, many of which in like manner are set off in clearing houses without any one dreaming that they are not paid. . .[2]

The interposition of a clearinghouse between the brokers substantially reduced the complicated process of settling among brokers on the exchange. With the clearinghouse managing the common clearing fund, each broker only had to pay or draw one draft to settle with all other brokers in a ring. And brokers with offsetting positions which did not "ring out" were relieved of the contracts by settlement of price differences with the clearinghouse, which paid the other parties.

Prior to the incorporation of the Board of Trade Clearing Corporation (the "Clearing Corporation") as a separately chartered Delaware corporation in 1925, the clearing function was performed by an in-house division of the Chicago Board of Trade. Participation in the exchange's clearinghouse was voluntary. The clearinghouse did no trade matching, but only collected from firms reporting losses and remitted to firms reporting gains on a "wash" basis. Individual firms did their own trade matching to determine their net obligations to other firms. There were no clearinghouse margin requirements, and the clearinghouse did not guarantee obligations among firms.

Dissatisfaction with the system led to various proposals throughout the years. All were voted down by exchange members until 1925, when the proponents of a "complete clearinghouse" succeeded in a bitter campaign and the Clearing Corporation was established. The Secretary of Agriculture wrote to President Coolidge in his 1925 annual report: "The Chicago Board of Trade adopted a proposal suggesting that it establish a modern clearing house. Probably no more progressive and far-reaching step was ever taken to insure prices accurately reflecting supply and demand."

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[2] 198 U.S. at 250.

Even though the establishment of the Board of Trade Clearing Corporation greatly enhanced the fairness and integrity of the futures trading process, the original Clearing Corporation performed only a fraction of its current activities. The principal contribution of the early Clearing Corporation was to require daily settlement of all gains and losses, and posting of maintenance margin to insure against losses on default of individual members.

The posting of maintenance margin, a performance bond on each outstanding contract, and daily settlement of price variation among clearing members greatly enhanced the integrity of the Chicago Board of Trade. Before the maintenance margin and daily variation settlement requirements, each broker accepted the credit risk of each other broker with whom he did business. Any losses occasioned by a broker default were borne by the other brokers holding outstanding contracts. Since contracts could remain outstanding for months at a time, wide price fluctuations could occur which greatly altered the financial condition of brokers.

Maintenance and variation margin, together, provided greatly improved protection against the default of any clearing member for the other clearing members. Daily payments of variation margin, the difference between the previous day's settlement price and trading day settlement price, kept credit exposure limited to a one day price move. Maintenance margin was collected and held for the duration of an open position to cover that one day exposure. Maintenance margin, also called original margin, is calculated to be sufficient to compensate a broker for a one day price movement which a defaulting broker cannot cover.

The Clearing Corporation was in an enhanced position to assess maintenance margin to protect other clearing members against losses, and require daily settlement of price variations. This ability to protect itself from the failure of individual clearing members led to the offer of a clearinghouse guarantee. The Clearing Corporation took the position of a buyer to every seller and a seller to every buyer with respect to the net positions of its clearing members.

The Clearing Corporation then bore the risk of any clearing member's default on its variation settlement obligations with respect to other clearing members. In addition to the original margin collected on open positions, the Clearing Corporation could also draw on its capital raised by sales of Clearing Corporation stock to clearing members.

Actual clearing of trades, i.e., determining net obligations among clearing members, was still performed by the individual clearing members themselves. Clerks in member firms manually paired purchase and sales memoranda, called "check slips," to determine the net gain or loss to be received from or paid to the Clearing Corporation. At the close of trading the clerks would compile a clearance sheet showing all that day's trades, which was sent to the Clearing Corporation, along with check slips showing with whom each trade was made, the quantity of the contracts, and other information. The check slips were the only written memoranda reflecting the oral contracts made in the pits of the exchange. In 1960 the clearing function was assumed by the Clearing Corporation, matching trade reports and computing net clearing member obligations. In 1963 the Clearing Corporation established a computerized clearing process to accommodate the rapidly expanding volume of trading.

The Modern Clearing and Settlement Process

The Clearing Corporation today provides clearing and settlement services for the agricultural and financial commodity futures and options contracts traded on the Chicago Board of Trade and its affiliated exchanges, the MidAmerica Commodity Exchange and the Chicago Rice and Cotton Exchange. Contracts traded on these exchanges each have various specifications, trading hours, position limits and price limits as determined by the rules of the exchanges.

Virtually all contracts have price limits set by the exchanges to limit daily profit and loss, and thus volatility. Additionally, the exchanges and the Clearing Corporation limit the number of contracts any individual customer or clearing member may own or control. Both of these restrictions have the effect of limiting the risk of loss to the Clearing Corporation occasioned by the failure of any one clearing member on a particular contract.

The Chicago Board of Trade is the principal exchange served by the Clearing Corporation. It is the largest commodities exchange in the United States and provides centralized markets for trading futures and options on futures contracts on a variety of agricultural, metal and financial commodities. Among these products are such traditional contracts as wheat, corn and soybeans, and the more recently established financial futures contracts, including contracts on U.S. Treasury Bonds (the most actively traded futures contract in the world), Treasury Notes and the Major Market Index. In 1988, approximately 70 percent of the volume of contracts traded on the Board of Trade were financial in nature. The average daily volume of financial futures traded on the exchange is about 300,000.

Tender of Trades

Contracts are traded on the floor of the exchanges by exchange members. Membership on the exchanges is controlled by the exchanges themselves, and is distinct from membership in the Clearing Corporation. Trading is done by open outcry in the pits located on the floor of the exchange. Traders call out their bids or offers and other traders accept orally. Traders are required to provide written records of transactions, "trading cards", to their clearing members who, in turn, report the trades to the Clearing Corporation.

To enhance trade reporting and audit trail capabilities, the Board of Trade recently changed its rules to require that traders and brokers file trading cards within 15 minute time intervals of when trades occur, and to be even more precise at the opening and closing of

trading. Clearing members collect the trading cards hourly. Clearing members then report trades to the Clearing Corporation within one hour of receiving the cards. Failure to report trades within the required time will result in automatic increase in the cost of clearing trades for that clearing member and subject the member to exchange disciplinary proceedings.

To facilitate tracking of suspect trades, the cards will soon receive exchange time stamps as they leave the floor. In addition, time cards are sequentially numbered for each trader in the pit. Each non-clearing member has one authorized primary clearing member for his personal trades, although that clearing member may authorize in writing the use of other clearing members to clear trades.

Trades are tendered to the Clearing Corporation for clearing by its clearing members who act on behalf of the parties to the trades, non-clearing exchange members, or for their own account. The trade information tendered by the clearing member should correspond to the trade information tendered by the clearing member acting for the opposite party to the trade.

The reporting of trades to the Clearing Corporation must be made by clearing members, and not by non-member traders or brokers themselves. All data received by the Clearing Corporation is received via data-entry terminals or computer-to-computer transmissions. Approximately 75 percent of trades are reported using on-line terminals located in the clearing members' offices, and 25 percent through computer transmissions. Physical media (cards, diskettes and tapes) were eliminated for data input in 1985, and would only be used under emergency backup situations.

Confirmations of trades filed with the Clearing Corporation by clearing members must show: (1) identity of both members, (2) the commodity or commodity option series involved, (3) whether bought or sold, (4) the quantity involved, (5) the delivery month, (6)

whether for customer, non-customer, or floor trade account, and (8) such other information as may be required by the Clearing Corporation to effect the matching of trades. The filing of a trade confirmation by a clearing member is deemed a tender to the Clearing Corporation for clearance of the trade.

Matching of Trades

After the trades are reported by clearing members to the Clearing Corporation, the Clearing Corporation matches both sides of the transaction using a computerized matching sequence program. The intra-day deadlines for trade reporting allow frequent comparison of trade data so that discrepancies may be located and the clearing members involved notified.

The Clearing Corporation currently has intra-day trade matching systems that allow matching of trades whenever the Clearing Corporation wishes. It now matches on a regular basis every 30 minutes. The results of these matches are available for review on member's office terminals. The unmatched trades reflecting errors may be corrected. Matched trades may not be changed. At 11:30 a.m. and 1:30 p.m., as well as at the close of trading each day, the Clearing Corporation produces paper reports of the matched trades. During the Board of Trade's evening tracking session, matching occurs every 30 minutes.

A reported trade that does not match will not be accepted by the Clearing Corporation, and the Clearing Corporation assumes no obligation with respect to such a trade. If a reported trade does not match, the clearing member for each side of the trade is informed via on-line reporting to his terminal or printed reports so that the clearing members may resolve the discrepancies. Matched and unmatched trade information is usually available within about 15 minutes of a reporting deadline so that additions, deletions and adjustments can be made before the expiration of the last reporting period at 7:00 p.m. The final daily matching and clearing process begins thereafter.

At the end of each trading day, between three and four percent of reported trades will have some discrepancy in their reported terms which prevents matching. In this event, the discrepancy must be resolved by the traders and the correction reported before trade opens in that contract the next trading day. The hour before trading begins is usually reserved for reconciling unmatched trades.

If reconciliation is not possible between the parties, their clearing members must report a trade with the same terms and the traders may then arbitrate the disputed difference through the exchange on which the contract was traded. In practice, very few disputes as to the terms of contracts go to arbitration, as traders prefer to settle such disputes amicably.

Upon the completion of the daily matching and clearing process, generally around 11:00 p.m. on the trading day, the Clearing Corporation provides to each clearing member a "recap ledger" detailing transactions, settlement and original margin requirements. This recap ledger is composed of a statement of trades and positions. The daily variation settlement position and the statement of original margin position are provided in a separate report. Pursuant to its bylaws, the Clearing Corporation interposes itself as the counter-party to each clearing member on a net basis for trades as soon as they are matched.

Clearing Corporation guarantee

Once the trade matched, the Clearing Corporation interposes itself as counterparty to both sides of the transaction, assuming the position of the seller to the clearing member buyer and of the buyer to the clearing member seller on a net basis. This substitution is effective in law for all purposes. The Clearing Corporation assumes all rights and obligations to such contracts as a counterparty to each side. However, the guarantee is only to clearing members, and not to any individuals on whose behalf the trades were contracted.

The Clearing Corporation is thus in the position of substituting its own guarantee of performance and its credit for that of each clearing member. The Clearing Corporation remains in the position of counterparty until the contract is removed from the books by offset or delivery. Approximately 98 percent of contract obligations are resolved by the purchase of offsetting contracts, so that less than 2 percent of contracts result in delivery. However, if a party defaulted on a delivery obligation the Clearing Corporation's guarantee would require the Clearing Corporation to make or receive delivery, or satisfy the financial obligations related to that delivery.

Liability of the Clearing Corporation on the contracts in the event of a clearing member default is limited to the amount of gain owed in respect of a price movement, and any performance required by contracts requiring delivery. The amount of gain owed by the Clearing Corporation to those with profitable positions will equal the amount of loss owed to the Clearing Corporation by a counterparty holding the opposite position. Original margin deposits are required to secure this contingent obligation to the Clearing Corporation. Variation margin payments, currently required on a routine basis twice a day, eliminate the Clearing Corporation's exposure to the extent of any price movement prior to the payment of variation margin.

Margin Requirements

The most important assurance of performance on contracts is the original and variation margin requirements of the Clearing Corporation.[3] Original margin functions as a guarantee of performance and secures the clearing member's obligations to the Clearing Corporation, while variation margin reflects changes in value of contracts with gains and losses distributed to the contract parties. Original margin is calculated daily on all open positions, and

[3] Clearing Corporation margins are distinct, both in magnitude and timing, from margins which customers are required to post with their brokers by exchange regulation.

must be posted before the opening of trading on the following day. Contracts are marked-to-the-market for collection of variation margin twice a day.

Original margin is held until an open position in a contract is closed by offset or delivery. The Clearing Corporation maintains the original margin deposits on contracts involving deliveries until the delivery is completed. Variation margin is calculated and collected through the last day of trading on contracts.

Original Margin

Original margin levels on all futures are set by the Board of Governors of the Clearing Corporation with the advice of the Margin Committee. The Margin Committee consists of five Governors from the Board of Governors, meeting as needed but at least once a month. Meetings may be held by conference call and recommendations determined by poll.

Original margin is set to ensure the obligation to the Clearing Corporation is satisfied, and covers the calculated risk of loss due to price movement on open positions for one day plus a cushion to cover the shortfall between the time of marking-to-market and the next variation margin call. Since there is no price risk on sales offset by identical purchases, original margin at the Clearing Corporation is required only on a clearing firm's net long (purchases) or short (sales) position. In a delivery month, however, margin on financial futures is required on a gross or per contract basis for both long and short positions.[4]

Margins levels are based on the advice of the Clearing Corporation staff, the Chicago Board of Trade Margin Committee, the volatility analysis and related information prepared by the Clearing Corporation and the Economics Division of the Chicago Board of Trade, and by the Margin Committee's own knowledge of markets. In an emergency, staff may

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[4] Usually positions in financial futures will be significantly reduced during delivery months as hedging strategies typically require movement to the next delivery month.

recommend a level of margin and secure approval of a course of action by telephone poll of the Committee. Because all Governors are active exchange members, they can convene quickly when necessary to examine the adequacy of original margin levels in light of market volatility and change such levels to reflect daily price changes. Margin levels are changed hundreds of times each year in response to market conditions and, accordingly, the procedure is well known and easily performed even in periods of great volatility.

Original margin for each contract is generally the same for all members, however, the Executive Committee of the Board of Governors has authority to require additional original margin, called "super margin," of any member. This would normally be done where there is greater than normal risk to the Clearing Corporation from the open positions of the clearing member. Super margin is rarely assessed, but has been assessed against individual clearing members about once a year in each of the past five years.

Whereas customer original margin is collected on a per contract, or gross, basis reflecting the risk on each contract individually, clearing member margin is collected on a portfolio, or net, basis (except in delivery months) and reflects the overall risk to the Clearing Corporation associated with the totality of contracts in the portfolio. The portfolio-based simulation model developed and used by the Clearing Corporation to determine risk on contracts is called Simulation Analysis of Financial Exposure (the "SAFE System").

The SAFE System combines all positions of the clearing member by proprietary and customer accounts into a portfolio. Price, volatility, and other risk factors are simulated to determine their impact on profits and losses in each portfolio. The analysis involves the construction of a matrix of 8 volatility levels and twenty-one price levels, or a total matrix of 168 cells. The Clearing Corporation establishes parameters to collect original margins based on the simulated losses of each portfolio under various scenarios pursuant to a system called standard

Portfolio Analysis ("SPAN"). SPAN is a modification of the SAFE system that permits it to be calculated on personal computers rather than mainframe computers. Because it uses fewer volatility and price levels, it generally results in a slightly higher margin. The Clearing Corporation continues to calculate risk using SAFE, and it its calculations of risk are greater than the SPAN calculations, seeks additional margin from the affected clearing members.

The original margin requirement changes daily with the positions held by a member and is calculated by the Clearing Corporation after each day's trading session. The level of original margin required is transmitted to clearing members and their settlement banks each evening. Additional required margin must be posted before the opening of trading on the next day.

Original margin may be posted in cash, Treasury bills, notes and bonds, or letters of credit issued by approved banks. Treasury bills, Treasury notes with a 5 percent haircut, and Treasury bonds with a 20 percent haircut, are accepted at market value or par, whichever is less, with a regular market revaluation. These securities are not held in clearing members' accounts and pledged to the Clearing Corporation, but are in the name of and in the accounts of and under the control of the Clearing Corporation.

Letters of credit must be presentable in Chicago and payable within 60 minutes in immediately available funds into a Clearing Corporation account which is maintained at each bank which issues letters of credit for deposit to the Clearing Corporation as original margin. The Clearing Corporation does not accept letters of credit from any one bank totalling more than $100 million, nor will it accept letters of credit on behalf of any clearing member in excess of 25 percent of the adjusted net capital of that clearing member.[5]

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[5] The Clearing Corporation ceased accepting letters of credit in respect of original margin in the Spring of 1984, following the near collapse of Continental Illinois National Bank and Trust. The ban was lifted in March of 1985, with the 25 percent limitation.

Stock in the Clearing Corporation owned by a clearing member may be pledged to satisfy original margin required for proprietary accounts with the consent of the Executive Committee of the Clearing Corporation.

While the bylaws permit the use of equity securities as original margin, the Clearing Corporation has never allowed this, because the securities may not provide adequate liquidity in a falling market.

The Clearing Corporation maintains separate accounts for clearing member original margin deposits. The Clearing Corporation will draw on these segregated original margin deposits only if a clearing firm fails to meet a variation margin call or other obligations to the Clearing Corporation. Deposits of original margin may not be withdrawn from a member's original margin account with the Clearing Corporation until such withdrawal is approved in writing by the Clearing Corporation.

Variation or Settlement Margin

Variation or settlement margin refers to the funds that a clearing firm must pay to the Clearing Corporation at least twice a day to settle price declines on contracts in the firm's account. Payments of variation margin remain separate from the original margin deposits and are applied to settlement only for that variation margin call. Price gains on corresponding contracts are distributed from these funds to clearing members with gains on contracts in their accounts. For example, a clearing member acting for a purchaser of a Treasury bond contract which declines $100 in value during the trading period will pay the $100 to the Clearing Corporation which will then pay the $100 to the clearing member acting for the seller of an equivalent contract. The Clearing Corporation requires variation margin deposits to be in the form of immediately available funds; no other form is acceptable.

Daily variation settlement amounts for members of the Clearing Corporation are the net of the change between the previous settlement price and the current settlement price, plus the difference between the price at which new contracts were established during the day and the current settlement price. In effect variation margining is a marking to market of each member's net position. Variation margin is assessed separately for net proprietary positions and net customer positions.

The Clearing Corporation regularly issues calls for variation payments at least twice a day: once at 6:00 a.m. as part of the daily official settlement process; and once at 2:00 p.m. The afternoon call reflects previously existing open positions, trades from the previous evening session, and all trades occurring before 10:30 a.m. of that trading day. Other variation margin calls may be issued as necessary.

Intra-day margin calls are an important means of assuring the ability of the Clearing Corporation to perform its obligations in the event of precipitous market movements. A shorter period between variation settlements reduces the risk of default by assuring the continuing ability of clearing members to meet their obligations to the Clearing Corporation. During the week of October 19, 1987, the Clearing Corporation issued early variation margin calls at 8:00 a.m. and 11:00 a.m., in addition to its regular 6:40 a.m. and 2:00 p.m. margin calls, on four of the five trading days.

Clearing members may pass on intra-day variation margin calls to their institutional customers "on the wire," requiring the customers to fund the clearing members within the hour to cover margins on their trades. The institutional customer base typically accounts for about 50 percent of a clearing member's customer margin being paid within one hour of the call. The size and capital of a customer figure in clearing member decisions to require immediate payment or to provide a line of credit, but competitive pressures among

clearing members also play a role. The clearing member's obligation to make variation margin payments to the Clearing Corporation is independent of the customer's obligation to make such payments to the clearing member. Thus a clearing member must make variation margin payment to the Clearing Corporation regardless of a customer default.

The Clearing Corporation makes variation margin settlements without regard to whether they have received payment from clearing members owing variation margin to the Clearing Corporation. This may result in a brief credit exposure. Where a clearing member gains substantially during the day, that member may request the Clearing Corporation release the amount of his gains. This feature could be important in the event that a clearing member required funds to meet obligations on other exchanges during a trading day.

Settlement Banks and Liquidity

The Clearing Corporation uses four settlement banks at which all clearing members maintain accounts for the payment and collection of original and variation margin. Each clearing member need only have accounts at one of the four. Clearing members generally provide written authorization to their settlement banks to transfer funds from their accounts in accordance with the instructions received daily from the Clearing Corporation. The Clearing Corporation transmits to the banks information relating to margin and premium payments of the bank's clearing members via facsimile transmission machine.

Where a clearing member does not have sufficient funds on deposit with his clearing bank to cover the assessed margin, the clearing bank may make an extension of credit to the clearing member in the form of a payment confirmation to the Clearing Corporation. This confirmation is particularly important to the settlement process, because the daily settlement call at 6:40 a.m. occurs before covering funds can be obtained over the interbank Fedwire transfer

system. Although sufficient funds may be available on deposit with a clearing member's principal bank, that bank cannot transfer the funds to the settlement bank until Fedwire opens.

Settlement banks typically have an unrevealed credit limit for the daily margin call confirmation. Above that limit the banks will contact the clearing member for assurance of solvency and/or require verification from the clearing member's principal bank that sufficient funds are available.

An agreement reached between the Clearing Corporation and its settlement banks in 1988 makes such confirmations of payment from settlement banks irrevocable, equivalent to a transfer of immediately available funds to the Clearing Corporation account at the bank. The agreements give such confirmations the status of a credit to the Clearing Corporation account at the settlement bank, and the form of confirmation is now an advice of credit transmitted by facsimile to the Clearing Corporation.

Fedwire currently opens at 7:30 a.m. Central Time, fifty (50) minutes after daily settlement confirmations are due by the Clearing Corporation and the trading day begins. It is the view of the Clearing Corporation that earlier opening of Fedwire would reduce daily settlement pressures because it would (1) allow easier movement of funds as required, (2) provide comfort to the settlement banks confirming payment, (3) aid margining and settlement in the mornings, and (4) smooth out the payments process. However, earlier opening of Fedwire may not substantially change the timing of payments if the New York banks do not open their own operations earlier. Some New York banks have indicated that they would make payments required by the morning margin call if involved in the settlement process, but such payments depend on Fedwire to transfer funds to Chicago.

Typically, the settlement process will require a small amount of transfers among the accounts at the various settlement banks. The Clearing Corporation does not use a

concentration bank for these settlement transfers, but determines net settlement transfer amounts and instructs each settlement bank to transfer the appropriate funds to accounts at the other banks as necessary. The Clearing Corporation debits, credits and reviews its accounts at all settlement banks on line via a computer linked PC. As a practical matter, such credits and debits to Clearing Corporation accounts may be recorded at various times on the bank's records depending upon the operational aspects of each bank and the abilities of the banks to move funds or make commitments to each other.

The Clearing Corporation has determined that it would be preferable to centralize the settlement process through Clearing Corporation subsidiary, and has chartered the Clearing Corporation Trust Company (the "Trust Company"), a limited purpose trust company, for the purpose. The Trust Company has made application for membership to the Board of Governors of the Federal Reserve System so that it might have access to Fedwire for making settlement.[6] Initially, the Clearing Corporation will be the only customer of the Trust Company. The Clearing Corporation has committed that the Trust Company will not use any other facilities of the Reserve Banks, such as the discount window.

Payments from clearing members in the form of funds or book-entry Government securities could then be made directly to the Trust Company from clearing members' principal banks, rather than to a Clearing Corporation account at one of the four settlement banks. Payments from the Clearing Corporation would be made directly from the Trust Company to clearing members' banks. Such direct settlement would reduce the incidence of late payment due to clerical problems at settlement banks. The Clearing Corporation believes that such a system would also largely eliminate the risk to itself of a settlement bank failure.

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[6] Application for membership in the Federal Reserve System by Clearing Corporation Trust Company (October 22, 1987).

Offset and Delivery

A contract is concluded either through offset or delivery. A clearing member may have his purchases and sales of contracts offset to the extent of their equality with a subsequent contract. With respect to the Clearing Corporation, trades for a customer may be offset against other house or customer trades of the clearing member. An offsetting transaction is deemed a settlement or adjustment of the prior transaction, except as provided in Bylaw 511 for commodity options. The first trades made are deemed the first offset.

Delivery designations occur through the Clearing Corporation, but the primary responsibility for accomplishing delivery is with the clearing members. The specifications for delivery (including timing) vary based on the underlying commodity and are set by the rules of the exchanges on which the contracts were sold.

The process of delivery of physical commodities or financial instruments starts with the sending of a delivery notice by the clearing member representing a seller of a futures contract to the Clearing Corporation via a computer transmission. This notice is an indication that the seller will deliver the contract commodity under the terms and conditions of the futures contract.

With futures contracts, the seller's clearing member transmits a delivery notice to the Clearing Corporation on a designated day, and buyers matched by the Clearing Corporation are required to confirm their intention to accept delivery on the same or succeeding day. Pursuant to exchange and Clearing Corporation rules, delivery notices are assigned to traders having the oldest open commitments to purchase the quantity specified in the delivery notice.[7] The Clearing Corporation then furnishes the buyer's name to the seller and the seller's name to

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[7] See, Chicago Board of Trade Rule 1048.00.

the buyer.

Upon receipt of the buyer's name the seller prepares invoices for the buyer describing the documents to be delivered and the amount of the settlement payment. Delivery prices are determined based on the settlement price one or two days prior to delivery, or on the last day of trading on a contract if the day has already passed.[8] This information is delivered to the Clearing Corporation which passes it on to the buyer. Buyers must generally accept delivery and make payment by 1:00 p.m. on the day of delivery.

With contracts for options on futures, the buyer issues an exercise notice to Clearing Corporation which in turn assigns the notice to an eligible seller. The Clearing Corporation will notify the buyer of the seller's name. Assignment of the futures contract which was the subject of the option will take place in the time and manner prescribed by the exchange.

Participant Defaults

Since the formation of the Clearing Corporation, no clearing member has ever defaulted. However, if a clearing member fails to meet his contract obligations or to meet margin calls in one hour or is suspended or expelled from the Exchange or the Clearing Corporation, then the clearing member is in default. Notification by the clearing member or his settlement bank that the margin call will not be met would constitute a default.

If a clearing member defaulted on its margin obligation, the member would be declared in default within a half hour of the default and the auditors of the exchange or the Clearing Corporation would be sent in to start liquidating proprietary positions. Customer positions would normally be transferred by assignment to other clearing members.

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[8] Clearing Corporation Bylaw 703.

The Clearing Corporation's exposure from a default would be limited to any adverse price movement on contracts between the last margin call met by the clearing member and the liquidation of outstanding contracts. Exposure will generally be mitigated by a mix of long and short contracts, of which some will gain while others lose value. Original margin, as discussed above, should normally cover any losses incurred by the Clearing Corporation.

In the event of a default the Clearing Corporation "may cause all open trades with such member to be closed in the open market, and any debit balance owing to the Clearing Corporation [to] be immediately due and payable."[9] With respect to clearing member positions, the Clearing Corporation has the options of (1) requiring the defaulting member to close any open house positions on the exchange, (2) performing exchanges-for-physicals to close positions, (3) assigning other clearing members to close open house positions on the exchange on behalf of the Clearing Corporation, or (4) closing open positions by offset.

The Clearing Corporation maintains real-time access to information about each clearing member's open positions which can be used to monitor a situation which appears to pose unusual risk. Once a default is determined, more detailed information would be sought by the Chicago Board of Trade Office of Investigation and Audits which would send employees in to examine the books and records of a defaulting member. The Clearing Corporation has the authority to use its own staff or employ specially skilled personnel to review a clearing member's books and records.

With respect to customer accounts, the Clearing Corporation may allow the defaulting member to retain accounts if it can raise the necessary margin through liquidating house positions, or the accounts may be transferred to other clearing members chosen by the defaulting member or the Clearing Corporation. The Clearing Corporation may feel obliged to

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[9] Clearing Corporation Bylaw 804.

help defaulting members meet margin obligations as long as this course does not jeopardize the resources of the Clearing Corporation or other clearing members. Transfer of customer accounts to another clearing member, if necessary, is made easier by the segregation of all customer accounts from proprietary accounts on the books of the Clearing Corporation.

If it were necessary to close open positions of a clearing member in default using other clearing members, the President would select several clearing members in each contract market where the defaulting member had significant exposure. The individual clearing members or senior officials of member firms selected would receive calls from the President or an Executive Vice President requesting execution of offsetting trades in the pit. The trades would be announced as being for the house accounts of the designated clearing members to prevent the markets reacting to knowledge of the default. The individuals asked to execute the trades for the Clearing Corporation would know that the trades related to a clearing member default, but the Clearing Corporation would not usually reveal the identity of the defaulting member. The actual floor traders making the trades would not be told that the trades were in connection with a default. Because several agents would be used to execute trades, no one agent would know the extent of open positions of the defaulting member. At the end of the day, trades done for the Clearing Corporation would be transferred to the account of the defaulting member where the open contracts would be offset, closing out the positions.

If a default became known late at night or on a weekend, exchanges-for-physicals might be conducted either through the defaulting clearing member or other clearing members. These contracts would be reported back the next day for offset of open positions on the Clearing Corporation books.

Those aware of a default are proscribed from trading on that knowledge by the bylaws of the Clearing Corporation. Bylaw 805 limits access to information on member positions

to the President and Vice President, except as "authorized by the Board or required by law." Bylaw 810, enacted April 20, 1988, prohibits any Governor or member of any Clearing Corporation committee from using or disclosing material, non-public information received as a result of participation in the Clearing Corporation.

Though there hasn't been an actual default by a clearing member, situations have arisen which precipitated clearing member liquidation. In April 1985 Bevil Bressler Schulman Inc. failed. An affiliate of First LaSalle Corporation, a clearing member has executed transactions with Bevil Bressler. The affiliate believed Bevil Bressler would default on its obligations, causing the affiliate default to First LaSalle. Although First LaSalle had sufficient capital and margin deposits, so that it had not defaulted to the Clearing Corporation, as a precautionary matter all of First LaSalle's customer positions were transferred to other clearing members. The excess were returned to First LaSalle.

Clearing Corporation Organization and Administration

Administration

The principal source for information on the Clearing Corporation authority and procedures is its articles of incorporation and bylaws. The bylaws provide for the Clearing Corporation's government and membership and for procedures of clearing, margining, and deliveries. Technical operations manuals document its operating procedures. On a day-to-day basis, the operating procedures are publicized by bulletins to clearing members.

The Clearing Corporation is owned by its approximately 140 members, none of which owns more than a seven percent interest. Stock in the Clearing Corporation is allocated pursuant to Bylaw 405, according to the volume of business carried by clearing members. Adjustments are made in these stock holdings every six months. Stock can be pledged as

original margin with the approval of the Executive Committee. Regardless of stock holdings, each clearing member has one vote.

The Clearing Corporation is governed by its nine-member Board of Governors. Governors must be members of the Board of Trade and stockholders in the Clearing Corporation, or be associated with firms which are members and stockholders. Three Governors are elected each year for three year terms. An Executive Committee of the Board is composed of its chairman and two vice chairmen.

The officers of the Clearing Corporation are selected by the Board of Governors. The Clearing Corporation has five principal officers: President, two Executive Vice Presidents, and two Vice Presidents for computer and financial matters.

Bylaw 218 provides for emergency resolutions by the Board of Governors by 2/3 vote of a quorum of Governors. Such emergency resolutions may affect accounts and positions of the Clearing Corporation and its members. Resolutions adopted under the bylaw could affect position limits, margin requirements, membership status, settlement prices and other matters which may affect member accounts and positions. The emergency resolution will supersede inconsistent resolutions and bylaws, but will lapse when (1) Board rescinds it; (2) the Commodity Futures Trading Commission does not approve it within 30 days; or (3) 90 days after its adoption. It does not appear that the Clearing Corporation has ever adopted an emergency resolution pursuant to Bylaws 218.

The bylaws and procedures of the Clearing Corporation are enforced against members principally by means of fines. The bylaws provide for assessment of fines by the President or his delegate against members as authorized by the bylaws or the Board. The most common reason for fines is late submission of trade data. These fines are more automatic than discretionary, and consequently promote compliance well. Various fines exist for other

violations.

The principal office of the Clearing Corporation is in the Board of Trade Building in Chicago. The computer facility at this location contains two mainframe IBM computers capable of independently matching, clearing and settling all trades executed on the exchanges. In addition to its downtown location, the Clearing Corporation has a "off-site" computer facility in the Chicago suburbs capable of functioning within approximately four hours of a disaster affecting the two IBM mainframes in the Clearing Corporation's main offices. The suburban facility is capable of directly receiving all trade data input directed to Clearing Corporation. Each day a complete set of all Clearing Corporation computer programs and data are transmitted to ensure that matching, clearing and settlement can be undertaken without difficulty. Mock tests are conducted regularly to assure the system will function if needed.

The Clearing Corporation has a New York computer facility used for collecting and distributing information to and from New York-based clearing members. The New York computer receives information from the Chicago computer facility and produces that information in printed form for New York clearing members. It also receives information from the New York members for re-transmission to the Chicago computer facility.

Membership Requirements

Limiting membership in the Clearing Corporation to financially sound, well-managed firms offers one of the Clearing Corporation's best assurances against loss. A Clearing Corporation clearing member must be a registered partnership, corporation, or individual member of the Chicago Board of Trade. The clearing member must demonstrate business integrity and financial responsibility, maintain capital requirements established by the Board of Governors of the Clearing Corporation, provide timely reporting of requested financial information, as well as maintain an office in Chicago. In addition, the member must do business

in commodities or securities which are cleared for their own or non-member accounts as well as maintain facilities and personnel which can provide for the expeditious and orderly transaction of business.

Clearing firms are responsible to the Clearing Corporation for performance on all contracts they submit for clearing. Clearing firms therefore, must deposit margins with the Clearing Corporation and are legally obligated to make these payments regardless of whether they have collected corresponding margin from their customers.

The specific financial and capitalization requirements are set separately for each clearing member and depend upon the type of business conducted by a clearing member. For example, a small clearing member company that trades a limited amount of grain products may not be required to meet the same financial and capitalization requirements as a primary dealer in Government securities with a large cash and commodities business.

The Clearing Corporation Membership Committee reviews each applicant's operational experience, ethical and professional reputation, managerial experience, proposed business plans, other business activities, ability to secure credit and liquidity, and any other relevant factors in making a recommendation on an application. The Clearing Corporation would then establish specific financial and capitalization requirements depending on the review and the type of business planned by the applicant.

The Clearing Corporation adopted a "parent guarantee" rule in 1986, to ensure the financial commitment of owners of clearing members for non-customer accounts of clearing members. Exceptions to the parent guarantee requirement have been made for firms which are deemed more than adequately capitalized, such as a few large investment banks with more than $1 billion each in capital.

Clearing members subscribe to shares of the Clearing Corporation at not less than $7,850 per share, and in proportion to the volume of their business. The Clearing Corporation retains all shares sold "to secure all obligations by members to the Clearing Corporation" and to protect its rights in case of stockholder death, insolvency or bankruptcy. The Clearing Corporation may require clearing members to subscribe to a new issue of shares in proportion to their holdings as needed to provided an infusion of capital to the Clearing Corporation.

The Clearing Corporation may suspend membership or clearing privileges for violations of any of the Clearing Corporation's articles of incorporation, bylaws or policies, but has not yet needed to do so with respect to any of its members. In the absence of an emergency, the Membership Committee would receive the facts surrounding the apparent basis for suspension or expulsion and provide the clearing member with a hearing before the Committee. Following the hearing, the Committee would recommend a course of action to the clearing member, who could accept the recommendation or appeal it to the Board of Governors. The clearing member would have the opportunity to appear before the Board. In an emergency the Board could take action under Bylaws 205 or 206 and paragraph 8(m) of the articles of incorporation to terminate membership privileges.

Financial Management

The income of the Clearing Corporation derives from a 5 cent per contract clearing fee, for which clearing members are billed monthly, and Clearing Corporation charges for non-clearing services such as risk analysis services and exchange surveillance services. Since the Clearing Corporation has not paid dividends, all profits are reserved.

The Clearing Corporation currently has capital of approximately $70 million, $64 million of which is invested in Treasury bills with a maturity of less than one year. The bylaws

permit investment in other securities, but the Clearing Corporation has not invested in securities other than Treasury securities. The more restricted investment in Treasury bills is aimed at assuring immediate access to funds through liquidation, if necessary.

The Clearing Corporation has committed lines of credit from four commercial Chicago banks totalling $250 million which provides for the payment of immediately available funds upon call for use by the Clearing Corporation. There are no material adverse change clauses in these letters of credit to interfere with their use in the event of a market crisis.

The Clearing Corporation also maintains a trust fund, valued at approximately $11 million. This fund may only be used to assist customers of clearing members who have been harmed by a clearing member default. The trust fund is entirely invested in Government securities with maturities of two years or less.

Federal Regulation of the Clearing Corporation

The Clearing Corporation as a clearing organization is overseen by the Commodity Futures Trading Commission ("CFTC") as part of its general supervision of the operations of the exchanges for which the Clearing Corporation provides services. In 1976, the CFTC first subjected the Clearing Corporation to direct regulation when it interpreted the term "contract market" as used in the Commodity Exchange Act to embrace clearing organizations. The regulation at issue required the Clearing Corporation and other commodities clearing organizations to submit to the CFTC for advance approval all proposed changes in articles of incorporation, bylaws, regulations, and stated policies.[10] Although the Clearing Corporation

[10] 17 C.F.R. § 1.41(a)(3).

challenged the regulation in the Federal courts, it was upheld on the grounds that clearing is an integral function of any contract market.[11]

Federal regulation of the futures markets dates from the passage of the Grain Futures Act of 1922 which prohibited trading of grain futures on any exchange not authorized by the Secretary of Agriculture as a contract market. The Grain Futures Act was the first successful Federal regulation of futures markets. The Act followed 165 bills introduced in Congress prior to 1922 which failed to pass, and the Supreme Court's invalidation of the Grain Futures Act of 1921.[12] Although the Chicago Board of Trade pursued its challenge to the Grain Futures Act to the Supreme Court, federal authority to regulate futures markets was upheld on the basis of Congressional authority to regulate interstate commerce.[13]

The Grain Futures Act set out conditions required for designation of contract markets, including filing of trade reports and exchange mechanisms to prevent manipulation of prices or cornering of markets. In the first case to test the enforcement provisions of the Act against the Chicago Board of Trade, the court did not find the Clearing Corporation directly subject to the Act, but did hold that the Board of Trade could be held accountable for actions taken by the Clearing Corporation.[14]

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[11] See, Board of Trade Clearing Corporation v. United States of America, No. 76-1905 (D.C. Cir. January 11, 1978).

[12] Board of Trade v. United States, 246 U.S. 231 (1922).

[13] Board of Trade v. United States, 314 U.S. 534 (1923).

[14] Board of Trade of the City of Chicago v. Wallace, 67 F. 2d 402 (7th Cir. 1933).

Non-Clearing Services of the Clearing Corporation

In addition to its clearing and settlement function, the Clearing Corporation provides a variety of compensated services unrelated to its primary exchange clearing and settlement role. The Clearing Corporation serves as the computer center for the Intermarket Information Sharing System. Under its agreements with all United States futures clearinghouses and the Option Clearing Corporation,[15] the clearinghouses each night provide the Clearing Corporation with the pay and collect, option premium and margin surplus and deficit data for each clearing member at each clearing organization. The Clearing Corporation processes this information in its computer center each night using software it developed for the system. The next morning, before trading begins, each exchange can view on Clearing Corporation supplied terminals or its own equipment for each of its members the member's financial obligations to the other clearinghouses. The service is provided at the cost of operating the program. The information sharing system agreement was signed before the October 1987 market break, and the system became operational shortly thereafter.

The Intermarket Information Sharing System is a significant risk evaluation system, allowing participating clearinghouses to review clearing member cash flows and overall obligations. In this way, clearinghouses can keep current on clearing member financial positions across market lines. The Clearing Corporation's risk analysis services and information sharing system provide useful central clearing information, while permitting independent and competitive clearing organizations.

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[15] The National Securities Clearing Corporation has been asked to participate in the system, so as to provide a full and complete risk analysis for combined markets. NSCC has declined to join to date.

The Clearing Corporation also provides about 80 subscribing customers with sophisticated risk analysis services. This service is also provided to the other exchanges and clearinghouses respecting clearing member aggregate risk exposures by customer and proprietary account, and to clearing members and futures commission merchants with respect to their proprietary and customer accounts. The service provides a daily financial analysis using the SAFE risk-calculation system via transmission to customer computers, on-line report viewing on terminals, and remote printing facilities in firms' offices in Chicago, New York or elsewhere throughout the world.

The Clearing Corporation also performs surveillance of large trader positions and open interests as required by CFTC regulation under agreements with its exchanges. Exchanges are required by the CFTC to record and report large trade positions taken in any contract to help the CFTC detect market manipulation and prevent cornering of markets.

The Clearing Corporation also provides bookkeeping services to numerous companies for their customers trading on any United States futures exchange and certain foreign exchanges.

The Chicago Mercantile Exchange

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I. Executive Summary

The Chicago Mercantile Exchange is a not-for-profit organization owned by its members. The Exchange provides a central marketplace for the trading of futures and options on futures in agricultural and financial products.

A Brief History

The Chicago exchanges grew out of merchants' needs to assure a supply of various commodities at a reasonable price. The merchants, through the exchanges, worked to establish standards of grades and measures to make trading easier. Out of these original commodity exchanges grew the demand for agreements on the future delivery of goods based upon standardized contracts. Exchanges have grown and changed since the early days. They still provide a forum for trading but now also serve (i) as a distributor of information regarding the markets, (ii) as a regulator of trading practices; and (iii) in some instances, as a clearinghouse for trades.

The Chicago Mercantile Exchange (CME) was established in 1919 as a successor to the Chicago Butter and Egg Board, which dates from 1898. The "Merc" has three trading divisions, the CME[1] which trades agricultural futures, the International Monetary Market (IMM) established as a separate corporation in 1972 to trade currency and interest rate futures, and the Index and Option Market (IOM) founded in 1976 (originally called the Associate Mercantile Market; renamed the IOM in 1982) to trade stock index futures, lumber futures and options on futures. In addition, the CME has its own clearing division providing the clearance and guarantee of all trades, as well as the oversight of all futures contracts which result in delivery.

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[1] Except for this reference to the CME division, usage of the acronym CME will stand for the Exchange itself.

A Contract - From Inception to Completion

While this paper focuses on futures and options on futures for financial instruments traded within the IMM and IOM, all transactions, regardless of whether they are financial or agricultural, follow the same basic steps to completion. Any contract offered on the Exchange is standard in all terms (commodity type, quantity, delivery date) except price, which must be agreed to by buyer and seller.

CME members trade standard contracts by the open "outcry" method in the "pit" established for that commodity. Open outcry involves a trader (member) calling out his bid or offer and another trader (member) accepting it orally. Traders are expected to confirm their trades orally or by hand signal as soon as possible. During and at the end of a trading session each trader then submits his personal written record of the session's transactions to a designated clearing member by whom he has been "qualified" for clearing.

The Clearing Division or Clearinghouse of the CME matches trades based on the information received from qualified traders as processed by their clearing members. When trades are matched and accepted by the Clearinghouse, the Clearinghouse becomes the contra-party to each side of the transaction, both to the buyer and to the seller.

The Clearinghouse concludes this matching process around 9:00-10:00 p.m. Central time (CT). A "Recap Ledger" is then provided to each clearing member around 12:00 - 1:00 a.m. CT after each trading day by the Clearinghouse. Margin and settlement requirements are based upon this official summary of trading activity. Margin functions as a risk control vehicle for the Clearinghouse, limiting its exposure to clearing members and as a performance bond for the clearing member, that customers will meet their contractual obligations.

Around 3:00 a.m. CT on the day following the transactions the Clearinghouse transmits settlement instructions (via facsimile copier) to the clearing members' four settlement

banks advising them of the funds which the Clearinghouse should receive and pay out in settlement of variation margin requirements and original margin due. By 6:40 a.m. CT, the Clearinghouse expects confirmation from each settlement bank of the clearing member payments due the Clearinghouse. In order for the markets to open, the Clearinghouse, based on settlement bank confirmation but no movement of funds, must trust that payments supporting these confirmations will be made later in the day in order to finally conclude settlement.[2]

Contract Analysis

Financial futures and options on futures trade based on parameters which reflect the characteristics of the underlying instrument as established by the exchanges. Clearing requirements, such as margin and contract settlement procedures, vary from instrument to instrument and are also established by the exchanges. This paper focuses on (i) two heavily traded, cash settled futures contracts (S&P 500 and Eurodollars), (ii) two futures contracts that end in delivery of an instrument (Treasury bills and foreign currency), and (iii) three options on futures contracts, all three of which result in providing a futures contract at exercise and two of which are automatically exercised at expiration if "in-the-money" (options on S&P 500 futures and options on Eurodollar futures).

Margin - Its Role and Rules

The CME employs two types of margin and applies them to both futures and options on futures. In the futures market, original margin functions as a performance bond. Variation margin or settlement variation reflects the daily marking-to-market of contracts and distribution of the resulting profits and losses. In contrast, in the options market, buyers of options pay the full premium (variation margin) at contract opening with no additional margin

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[2] Contractual agreements between the Clearinghouse and settlement banks have been developed to address this topic more precisely.

payments required thereafter. The option writer (seller) receives this premium but must maintain it in a margin account in addition to a risk margin. This option premium is then marked-to-market daily.

The CME, unlike many other clearinghouses, collects original margin from its clearing members on a gross basis, not on a net basis. However, offsetting positions, inter and intra market spreads, along with margin credits are used to reduce the final original margin amounts payable by the clearing member.

Clearing members' margin payments are made to the Clearinghouse at least daily. Cash, U.S. Treasury bills or letters of credit are acceptable instruments for payment of original margin. Payment of settlement variation is made in cash through settlement banks which pay or receive a net figure for each clearing member, determined by the Clearinghouse, which represents the gains and losses of a clearing member and its clients from trades held or entered into within the last trading cycle.

II. General Discussion of the Market and Structure of the Organization

Background

The Chicago Mercantile Exchange (CME) was established in 1919 as a successor to the Chicago Butter and Egg Board, which in turn dates from 1898. The International Monetary Market (IMM) dates from 1972 as a corporation in partnership with the CME. In 1976 the IMM was merged into the CME as one of its divisions.

The IMM introduced financial futures contracts in 1972 when seven currency futures contracts were initiated. In January 1976, the IMM introduced the first interest rate futures contract based on a money market instrument with its three-month U.S. Treasury bill futures contract. The increasingly popular and heavily traded three-month Eurodollar time deposit contract was introduced in 1981. In recent years the Eurodollar contract has become the dominant short-term interest rate futures contract in the U.S., replacing the Treasury bill contract in that role.

A second division of the CME -- the Index and Option Market (IOM) division -- was created and activated in 1982 for the trading of index futures and options on futures contracts. The S&P 500 stock index futures contract began trading in April 1982. It followed closely on the heels of the first stock index futures contract which was the Value Line contract established by the Kansas City Board of Trade in February 1982. The S&P 500 futures contract has proved by far to be the most heavily traded of the various stock index futures contracts offered by U.S. exchanges. Trading of options on the S&P 500 futures contracts began in 1983. Subsequently, the IOM added options on the IMM's Eurodollar futures contracts in 1985 and Treasury bill futures contracts in 1986. The Eurodollar options contract quickly proved attractive with average

daily volume climbing to nearly 6,000 contracts per day in January 1986. Options contracts have also been established for five currency futures contracts.

In the 1980s, financial futures have proved to be the growth area for the CME In 1980 agricultural futures accounted for about 50 percent of CME activity but fell to only about 15 percent in 1987. In the U.S., the CME offers the dominant short-term interest rate, stock index, and currency futures contracts. Its options on financial futures have failed to achieve the same pre-eminent position but the options on several currency futures have registered respectable performances. The agricultural-financial trading balance is likely to continue, although the S&P 500 based futures and options products registered sharply reduced volumes after the October 1987 crash and volume in those contracts has continued to run below the pre-October levels.

Financial Futures and Options contracts currently traded on the CME include:[3]

	Futures		Options on Futures	
	1988/1987 (thousands)	Percent Change	1988/1987 (thousands)	Percent Change
Interest Rate Contracts				
90-day T Bill	1,374/1,927	-28.7	6/12	-49.1
Eurodollar	21,705/20,416	+6.3	2,600/2,570	+1.2
Currency Contracts				
Australian Dollar	76/53	+42.4	7/0	--
British Pound	2,616/2,592	+0.9	543/569	- 4.5
Canadian Dollar	1,409/915	+54.0	314/49	+544.7
Deutsche Mark	5,662/6,037	- 6.2	2,734/3,126	- 12.5
ECU	0/300	-100.0	NC	NC
French Franc	4/10	- 62.3	NC	NC
Japanese Yen	6,433/5,359	+20.1	2,945/2,251	+30.8
Swiss Franc	5,283/5,268	+ 0.3	1,070/1,053	+ 1.6
Equity-Related Contracts				
S&P 500	11,354/19,045	- 40.4	735/1,877	- 60.9

NC = No contract.

Note: Contract volumes are rounded to nearest thousand; percent changes are calculated using actual contract volumes.

Source: CME Monthly Volume Report (December 1988).

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[3] The third division of the CME is the Chicago Mercantile division. It is devoted to agricultural futures contracts.

Internationalization and New Developments

In 1984 the Singapore International Monetary Exchange (SIMEX) began trading Eurodollar futures contracts with specifications identical to those of the CME. The two exchanges established a linked clearing program -- the Mutual Offset System (MOS). Through this system, positions opened on one exchange can be offset ("closed") on the other exchange. That is, CME participants can use this facility to execute trades on SIMEX and then have those trades transferred back to the CME as new or liquidating trades. Similarly, SIMEX firms can execute trades on the CME and then transfer those trades back to SIMEX.[4] This has the effect of expanding the trading hours of each exchange. Currently, the MOS is in effect for the Eurodollar, Deutsche mark, Japanese yen and British pound futures contracts.

In September 1987 the CME announced plans for an additional international trading system to be carried out jointly with Reuters.[5] The plan envisions a global electronic trading system originally called Post (Pre) Market Trade (P-M-T) and now named GLOBEX. The system, scheduled for implementation in 1989, would provide worldwide "24-hour access" to the CME's futures and options on futures markets and clearing system. This would be accomplished by supplementing the existing "open outcry" system with off-hours electronic access via Globex. While many details remain to be worked out it, is expected that GLOBEX will also involve other exchanges; the New York Mercantile Exchange, the Sydney Futures Exchange, the Marche a Terme International de France (MATIF) have already joined the CME as partners in GLOBEX. Many details with respect to GLOBEX remain to be worked out.

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[4] As a practical matter, SIMEX trades are transferred to the CME substantially more often than vice versa.

[5] Chicago Mercantile and Reuters Set Link," New York Times, September 3, 1987.

The CME recently received CFTC approval on its proposal for a futures contract based on the Nikkei Stock Average.[6] (The CME already had obtained a required "no-objection" approval from the SEC for the contract.) The CME expects that the contract's trading hours would overlap with those of its Japanese yen futures contract (7:20 a.m. to 2:00 p.m. Central Time). This would also overlap with trading hours for some Japanese stocks which are traded in London and New York. Firm quotes on Japanese stocks are available in London from 6:30 a.m. (12:30 a.m. CT) until 3:30 p.m. (9:30 a.m. CT) with trading activity extending until 6:00 p.m. (12:00 noon CT). In contrast to other CME contracts, the Exchange plans to have settlement variation payments made at the Clearinghouse level in yen (rather than U.S. dollars). The Exchange has in principle designated certain Japanese and U.S. banks to act as settlement banks for the purpose of making yen settlement variation payments and holding customer segregated funds. The list includes: Bank of America NT & SA; The Bank of Tokyo, Ltd.; Citibank NA; Continental Illinois National Bank and Trust Company of Chicago; The Dai-Ichi Kangyo Bank, Ltd.; The First National Bank of Chicago; The Fuji Bank, Ltd.; Harris Trust and Savings Bank; The Mitsubishi Bank, Ltd.; The Mitsui Bank, Ltd.; The Sanwa Bank, Ltd.; and The Sumitomo Bank, Ltd. Final designation is subject to execution by each bank of an operating agreement with the Exchange.

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[6] The Nikkei stock index is a widely followed measure of Japanese stocks listed on the Tokyo Stock Exchange. It is a price-weighted average of 225 stocks calculated by Quotation Information Service Center K.K., as subsidiary of Nikkon Keizai Shimbum, Inc.

IMM Interest Rate Futures and Options on Interest Rate Futures

Interest Rate Futures

Two major interest rate futures contracts are traded on the IMM -- three-month U.S. Treasury bill futures contracts and Eurodollar time deposit futures contracts. The three-month T-Bill futures contract was introduced in 1976 and was the first contract to be based on a money market instrument. The Eurodollar time deposit futures contract was initiated in 1981 to facilitate more flexibility in managing interest rate risk and was the first futures contract to be cash settled.

These two interest rate futures contracts have many similarities in specifications and market convention. Both contracts are agreements to buy or sell $1 million of the underlying instruments at specified future dates. Both use a similar pricing convention -- a price index derived by subtracting the interest rate from 100.00 (i.e. an interest rate of 10% translates to an index price of 90.00 = 100.00-10.00). Both expire in the same contract months -- March, June, September and December. Moreover, both contracts specify a minimum price fluctuation of .01 (the equivalent of $25), have no price limits, and have the same trading hours (7:20 a.m. - 2:00 p.m. Chicago time).[7] The similar contract specifications simplify trading in the two contracts, and a substantial amount of arbitrage activity between the two contracts exists.

The major operational difference between the two contracts is in settlement procedures. The Eurodollar contract is settled in cash. There is no delivery of the underlying instrument (i.e., a three-month Eurodollar time deposit), rather, the delivery procedure consists

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[7] Close on last day of trading in the Eurodollar contract is at 9:30 a.m. Chicago time (3:30 p.m. London time). The U.S. Treasury bill contract ceases trading at 10:00 a.m. Chicago time. The last day of trading for the Eurodollar contract is the second London business day prior to the third Wednesday of the contract month. The last trading day in the bill contract is tied to the U.S. Treasury's bill auction schedule.

of marking the long and short positions to market on the expiration date. Consequently, the market settlement price reflects the cash market and is based on the London Interbank Offered Rate (LIBOR).[8]

The T-bill contract, however, is settled with the delivery of a specified U.S. Treasury bill. The futures settlement price on the last day of trading in the contract determines the purchase price to be paid by the long to the short for the delivery of Treasury bills with three-months left to maturity. The supply of deliverable bills typically will include new three-month issues, as well as old six-month and 52-week bills which now have three-months until maturity.[9] Exhibits I and II outline the delivery mechanism.

The typical schedule in the bill contract's expiration week is for the new three-month deliverable bill to be auctioned by the U.S. Treasury on Monday for settlement the following Thursday which is also the first delivery day for the futures contract. The last day of trading in the futures contract is the business day preceding the first delivery day (usually Wednesday). Consequently, those short the contract and intending to make delivery have several means by which they can obtain the bills needed to make delivery: (1) bid for the new three-month bills in the three-month bill auction; (2) buy those bills in "when issued" trading before or after the auction; or (3) buy the already outstanding bills with three months remaining

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[8] The final settlement price for the Eurodollar futures contract is based upon two random polls by the CME clearing house of twelve reference banks active in the London Eurodollar market. One poll is taken at a randomly selected time within the final 90 minutes of trading with the second poll taken at the termination of trading. In each poll, the selected reference banks provide their perception of the current London Interbank Offered Rate (LIBOR) for three-month Eurodollar Time Deposit funds. In each poll the two highest and two lowest quotes are dropped. The final settlement price is calculated as the arithmetic mean, of the remaining quotes rounded to the nearest 1/100th of a percentage point, expressed in terms of the IMM index. To reduce the likelihood of manipulation, the CME does not make public the randomly selected polling time, the banks on the reference list eligible for random selection, or the names of banks actually polled.

[9] Depending upon holidays and calendar effects the deliverable bill will have 90, 91, or 92 days left until maturity as of the first delivery day.

maturity in the secondary market.

In this setting, the deliverable supply of T-bills is limited, whereas that is not the case with the cash settlement of Eurodollar contracts. The limited deliverable supply of T-bills can be of importance as there may be open interest calling for delivery of more securities than readily available which satisfy the contract specifications. This implies a certain risk inherent in the T-bill futures contract. For example, market participants anticipating a large demand for the particular deliverable bill may buy and hold it, instead of lending it, and put unexpected upward pressure on its price. Those who are short the T-bill futures contract may have to obtain this bill at an unanticipated high price, if they can find it at all, or close out their futures position at a high price. In fact, there may have been a few instances in recent years where the futures contract and deliverable bill have been "squeezed". Nonetheless, most futures contracts do not make it as far as delivery as most participants prefer to offset positions in the "near" contract, as expiration approaches, with new positions in the next contract. Deliveries in recent years have averaged around $2 billion (2,000 contracts) with the record delivery $5.2 billion (5,200 contracts). This compares with total trading volume in T-bill futures of 1,373,555 contracts in 1988 and 1,927,006 contracts in 1987.

Exhibit 1

Treasury Bill Futures Delivery Mechanism

1. Clearing members, on behalf of those short the futures contract, make arrangements to deliver the required T-bills to one of the four Chicago settlement banks by 1:00 p.m. CT on the specified delivery day (the selling clearing member chooses the delivery day; the invoice price is the same regardless of which of the three eligible business days is chosen). Securities deliveries to the settlement banks are made over Fedwire.

2. The Clearinghouse provides each settlement bank with a ledger from the T-bill delivery subsystem of its clearing system. The ledger notifies each settlement bank of the deliveries to be expected from selling clearing members and provides instructions to deliver out the incoming T-bills to the account specified by the buying clearing members.

3. Payment from buyer to seller is made by wire transfer of Federal funds against transfer of the T-bills.

4. Imbalances of buyers and sellers at the individual settlement banks require transfers of T-bills and payments among the settlement banks.

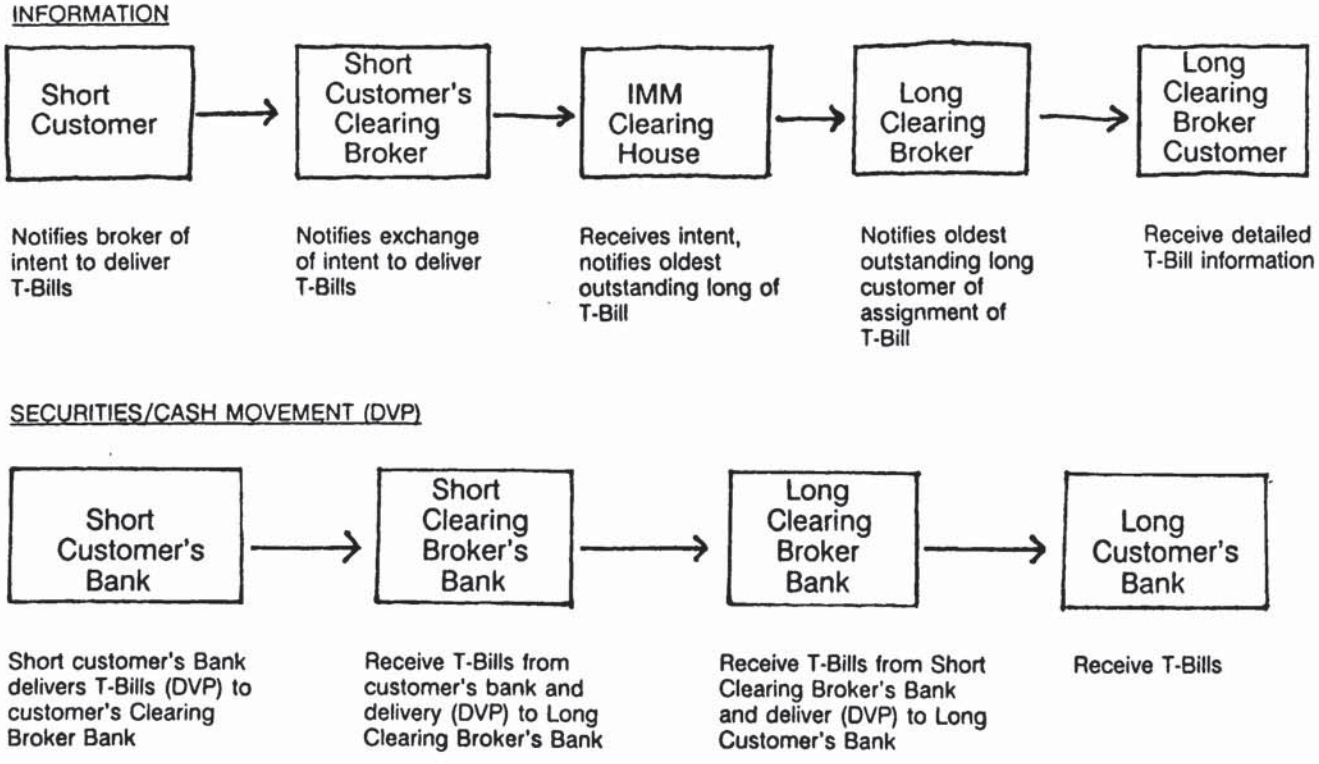
5. Clearinghouse accounts are not involved in the delivery process. Therefore, the Clearinghouse does not risk having to finance T-bills overnight if those bills could not be turned around before Fedwire closes. This leaves the risk of overnight financing with the settlement banks.

Source: "Clearing House Banking Interfaces," Chicago Mercantile Exchange, Clearing Division, White Paper Series, December 1987.

SOURCE: CHASE MANHATTAN BANK, N.A.

Exhibit II

QUARTERLY DELIVERY CYCLE


INFORMATION
Short Customer
Short Customer's Clearing Broker
IMM Clearing House
Long Clearing Broker
Long Clearing Broker Customer
Notifies broker of intent to deliver T-Bills
Notifies exchange of intent to deliver T-Bills
Receives intent, notifies oldest outstanding long of T-Bill
Notifies oldest outstanding long customer of assignment of T-Bill
Receive detailed T-Bill information
SECURITIES/CASH MOVEMENT (DVP)
Short Customer's Bank
Short Clearing Broker's Bank
Long Clearing Broker Bank
Long Customer's Bank
Short customer's Bank delivers T-Bills (DVP) to customer's Clearing Broker Bank
Receive T-Bills from customer's bank and delivery (DVP) to Long Clearing Broker's Bank
Receive T-Bills from Short Clearing Broker's Bank and deliver (DVP) to Long Customer's Bank
Receive T-Bills

Options on Eurodollar Futures

Options on Eurodollar futures were introduced in the Index and Options Market (IOM) division of the Chicago Mercantile Exchange (CME) in 1985. An options contract on Eurodollar futures (as with an option on any futures contract) consists of two types: calls and puts. Calls give the right, but not the obligation, to buy Eurodollar futures at a fixed price (the exercise price). Puts give the right, but not the obligation, to sell Eurodollar futures at a stated exercise price. Options contracts on interest rate futures contracts, like the underlying futures contracts, are used by risk averse investors and others to manage interest rate risk and control market exposure, as well as for arbitrage and speculation.

Options on Eurodollar futures give the holder the right to buy or sell 1 (one) Eurodollar futures contract (equivalent to $1 million of three-month Eurodollar time deposits). The contract months are the same as the CME's interest rate futures contracts--March, June, September and December. Options on Eurodollar contracts have specific strike price intervals such that at levels below 91.00, intervals are .50 point and at levels above 91.00, intervals are .25 point. The minimum price change is .01 or $25, although a trade may occur at a price of .005 or $12.50 if it results in position liquidation for both parties. Moreover, there is no price limit. The trading hours and last day of trading are identical to that of Eurodollar futures. However, the options are exercisable on any trading day until expiration.

There is no margin requirement for a participant buying either a put or a call as the price paid for the option (the premium) is the buyer's maximum risk exposure. The option seller assumes the obligation of taking either a long or short futures position (depending on if a put or call is sold) should an exercised option be assigned to the seller. The option seller earns only the premium, but is exposed to open-ended risk. Consequently, the seller of an

option contract is subject to margin requirements. The option seller can offset the put or call by buying the same option.

	Option Margin Requirements	
	Risk	Margin
Option Buyer	Premium	--
Option Writer	Unlimited	Premium, Marked-to-Market Daily

Option contracts may be exercised on any trading day (inclusive of the day the option is purchased). Typically, however, only deep in-the-money options (with little or no time value) would be exercised prior to expiration since exercise precludes capture of the option's time value.[10] Upon exercise, a writer of the same option is randomly assigned. Futures positions for the exercising party and the assigned writer are established as of the next trading day. Exercise of a put option results in a short futures position for the exerciser and a long futures position for the assigned writer with both positions established at the exercise (strike) price. The resulting futures positions are reversed in the case where a call option is exercised.

The futures positions established as a result of exercise before an option contract's expiration can be closed out same-day or maintained. If the exercising holder or the assigned writer maintains the resulting futures position, margin requirements are imposed with the initial marking reflecting the difference between the exercise price and the closing futures

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[10] The intrinsic value of an option is the gain which can be realized through exercise of the option. Only in-the-money options have intrinsic value. The time value of an option is the difference between its premium (price) and its intrinsic value. Options with time to run before their expiration date will generally have time value reflecting the possibility that price movements in the underlying will put them into the money, or further into the money (and reflecting the asymmetric response of an option's intrinsic value to increases and decreases in the price of the underlying). An in-the-money option's intrinsic value can be captured through exercise but its time value can only be captured by selling the option.

price. Alternatively, if either were to liquidate the new futures position same-day, that party's mark would be the difference between the exercise price and the price at which the futures position was liquidated.

The CME Clearinghouse automatically exercises in-the-money Eurodollar and S&P 500 options at expiration. Since CME Eurodollar and S&P 500 futures contracts are cash settled and the futures and the option on the futures expire on the same day, exercise results in a credit (debit) to the option holder (writer) determined by the difference between the exercise price and Eurodollar futures final settlement price.

Market Participants

Dealers in U.S. Government securities are among the more important participants in the T-bill and Eurodollar contracts. Their participation is best viewed as a natural extension of their activities in the cash securities markets. Dealers use futures and options positions to substitute for cash market positions for hedging and position taking, and as an additional source of arbitrage opportunities.

Dealers seek profit in the cash market by making markets, engaging in arbitrage activities and taking outright positions based on expected interest rate movements. First, profit can be garnered from taking advantage of bid-ask spreads--that is, making markets. While a minor profit source for dealers in the U.S. Treasury market, a willingness to make a market is in a dealer's best interest. A good customer flow provides dealers with useful market information. Customer orders can coincide with a dealer's desired arbitrage and/or position taking strategies. Often, however, the flow of customer orders fails to complement the dealer's desired position strategies. In these cases, offsetting futures and options positions can be established to hedge the unwanted cash position, enabling the dealer to both meet customer demands and maintain desired market exposure. Moreover, dealers may want to maintain some

cash inventories to facilitate market making and these futures contracts provide a useful hedge for those positions.

The futures market can be especially efficient for establishing a short position. Unlike taking a short position in the cash market, a dealer does not have to be as apprehensive about offsetting the position by getting caught in a squeeze (or not being able to buy back the security). Short futures positions are easily initiated and can be covered by buying back the contract. Moreover, the cost of borrowing the shorted security is avoided. Therefore, dealers can often manage interest rate exposure more safely and accurately.

Arbitrage, or taking advantage of price disparities between the cash and futures markets and within the futures markets, is another major use of the interest rate futures contracts. For example, dealers (and others) can arbitrage between the cash market (i.e., T-bills or Eurodollar time deposits) and the futures market (i.e., T-bills or Eurodollars). To achieve a profitable arbitrage, participants sell the relatively expensive instrument and buy the relatively cheap instrument. However, arbitrage opportunities are usually short-lived as price disparities are "arbed away". That is, as participants recognize the price discrepancy, they will buy the relatively cheap security and sell the relatively expensive security until prices adjust to the normal or equilibrium relationship. Many participants also position themselves to take advantage of price relationships which they estimate as being "unusual". Of course, such positioning involves risk since there is no guarantee that prices will move back to relationships they regard as normal, or that they will do so over the contemplated time interval.

Finally, dealers and others profit from trading in interest rate futures contracts simply by taking an unhedged position one way or the other based on expectations on the direction of interest rates. For instance, if a dealer believes that interest rates are moving higher (and prices will fall), the trader will go short, or sell, either T-bill or Eurodollar contracts.

Conversely, participants go long, or purchase interest rate futures contracts if expectations are that interest rates are falling. Similarly, various strategies employing options on futures contracts can be employed to try to profit from expected interest rate moves and the expected volatility of interest rates.

Commercial banks and thrifts are important users of the Eurodollar futures contracts for gap management and hedging purposes. For example, the cost of a floating rate liability can be "fixed" by shorting Eurodollar futures contracts (a single contract month, or successive contract months to lock in funding costs for a longer time interval). This strategy lengthens the effective maturity of the institution's liabilities. Alternatively, an institution with floating rate assets and relatively rate-insensitive funding (for example, retail deposits) can shorten the effective maturity of its funding by establishing long futures positions.

Eurodollar futures have proved attractive for gap management because they exhibit less basis risk than Treasury bill futures. This follows because credit quality concerns tend to impact funding costs and Eurodollar futures similarly. Also, because the Eurodollar contract is cash settled, basis risk associated with delivery shortages--a risk inherent in the Treasury bill contract--is eliminated.

Eurodollar futures and options on Eurodollar futures are also used to create caps, collars and floors, or to manage interest rate risk by those providing such instruments to end-users. They are also frequently used to manage interest rate risk arising from being a principal in interest rate swaps.

The TED Spread

The spread between the three-month T-bill futures and the three-month Eurodollar time deposit futures contracts with the same expiration date is known as the TED (T-bill EuroDollar) spread. TED spread trades are one of the more popular and well known futures

spread trades employed by a variety of participants. Participants engaging in TED spread trades will simultaneously purchase one contract (either T-bill or Eurodollar) and sell the other in the same contract month. The two contracts traded on the CME have their own trading pits in close proximity to each other, which encourages such spread trades.

Participants, noting the variation in the spread between T-bills and Eurodollars, trade the TED based on perceptions of what will happen to this differential. T-bills, guaranteed by the U.S. Treasury, are deemed less risky than Eurodollar deposits. T-bills tend to be more expensive than Eurodollars reflecting this risk-free characteristic and the respective futures contracts also over time necessarily conform to this pricing relationship. Therefore, a positive spread exists between the price of T-bill and Eurodollar futures contracts. In essence, participants trading the TED spread can be viewed as positioning on "quality" expectations. Therefore, should a participant expect financial instability of some sort, a long TED spread position (buying the bill futures, and selling the Eurodollar futures) would be appropriate as this gap would tend to widen if the anticipated instability occurs.

If an individual expects the TED to widen, then it is expected that the bill futures prices will rise more, or fall less, than Eurodollar futures prices. The individual would then "buy the TED spread" in one of two ways--as a single spread order or two separate orders. The optimal transaction, though, is the single spread order which simultaneously executes both sides of the trade. The procedure to buy the TED spread in a single transaction is outlined in Exhibit III. Of course, these futures contracts are traded for a variety of purposes, making actual movements in the TED spread subject to the complex interaction of a variety of forces.

Exhibit III

Execution of the TED Spread Order

- Customer calls futures broker with intention to purchase TED spread.
- Broker calls firm's desk outside the T-bill and Eurodollar pits and receives bid/offer quotes of the spread* (i.e., can execute buy order at the offer and can execute sell order at the bid).
- Customer decides to have his broker lift the offer side; or buy the TED spread.
- Order is executed and confirmed.
- Broker informs customer of margin requirement (initial and maintenance margins required for spread positions in such contracts as bills or Eurodollars).

* Bid/offer of the spread can be translated into bid/offer for each of the T-bill and Eurodollar futures contracts.

Source: "Treasury Bills over Eurodollar Time Deposits: The TED Spread," Chicago Mercantile Exchange, 1987.

CME Stock Index Futures and Options

S&P 500 Stock Index Futures Contract

The CME's S&P 500 stock index futures contract is the dominant stock index futures contract in the U.S. By the mid-1980's it accounted for well over 50 percent of stock index futures trading and has since become even more dominant. Moreover, since as early as 1984, the average daily value of trading in the CME's S&P 500 contract has exceeded the value of stocks trading on the New York Stock Exchange. The contract is based upon the S&P 500 composite stock price index -- a widely referenced benchmark measure of stock market performance. Because the S&P 500 index is more broadly based than the frequently cited Dow Jones Industrial Average (which is based upon only 30 stocks) it is often used as a benchmark for judging the performance of more diversified stock portfolios.[11] The S&P index is capitalization weighted which also aids its ability to capture or "track" changes in the overall value of the stocks.

The S&P 500 stock index futures contract has a contract size (value) equal to $500 times the futures contract price. For example, the closing price of the June futures contract on May 16, 1988 was 259.55. Therefore, the closing value of the June contract on May 16 was $129,775 = $500 x 259.55. The minimum price change or "tick" is .05 which has a value per contract of $25 ($500 x .05).

As with other stock index futures contracts, this contract is cash settled. The contract months are on the March-June-September-December cycle with the last day of trading

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[11] The index is designed to be diversified; it includes: 400 industrials, 40 utilities, 20 transportation and 40 financial stocks. The market value of the 500 firms equals about 80 percent of the value of all stocks traded on the New York Stock Exchange. See "Using the S&P 500 Stock Index Futures and Options" Chicago Mercantile Exchange, p.4.

on the Thursday prior to the third Friday of the contract month. Currently, the final cash settlement is based upon the difference in the contract's value at the close of trading on the expiration Thursday (expiration day trading ends at the usual time -- 3:15 Central time) and a special opening quotation of the cash stock index on Friday morning.[12] The special opening quotation is based upon the official openings of the 500 index stocks with the index calculated to the nearest .01. It is worth noting that in situations where there are order imbalances for a stock at the opening or significant news pending there will be a delayed opening for the stock(s) affected. In contrast to the CME's procedure for calculating the index settlement value, the standard opening valuation of the S&P 500 cash stock index in such cases uses the last sale prices for stocks not trading at the opening. Particularly during periods of market turbulence, use of last sale prices can significantly distort the calculated value of an index.

In the wake of the October 19 market break the CME has instituted several changes with respect to the S&P 500 futures contract. For example, the CME Board of Governors has put in place a policy to regularly adjust on a monthly basis the initial speculative customer margin requirement applied to the contract to 15 percent of the contract's value (see Exhibit IV). This review process supplements the Board's authority to change margins on an ad hoc basis in response to market developments. The CME has also instituted opening and daily

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[12] This settlement pricing procedure was instituted to try to avoid the unusual price volatility which often characterized "triple-witching Fridays". Previously, the futures contract settlement value was based on the closing value of S&P 500 index on the contract's final trading day. The triple-witching-hour arose on the four Fridays a year when index futures, index options and stock options all expired. On this final trading day index arbitrageur could have large hedged positions which consisted of being long stocks and short options or futures, or short stocks and long options or futures. On a net basis the arbitrageur were neither long nor short. Therefore, the arbitrageurs were indifferent to the price level at which the two legs of the arbitrage positions were unwound as long as both legs were unwound at the same price. To accomplish this the arbitrageur would use market-on-close orders to close out their stock positions ensuring that the required stock sales (purchases) would be executed at the prices used to calculate the S&P index value used to settle the futures and options contracts. The resulting large order flows at the stock market's close often resulted in large stock price movements. In addition to the CME's change in its settlement procedure, the NYSE now reports large order imbalances in stocks prior to the opening of trading on the settlement morning.

price limits for the stock index contract. An opening price limit of five index points is in effect for the first ten minutes of trading while the daily price limit of 50 points as well as interim price limits are linked to both the lead contract price and activity in the cash market (See Exhibit V). Unlike earlier price limits, the current system of price limits is in effect on the last day of trading.

Exhibit IV

Post October 1987 Speculative Margin Requirements - S&P 500 Stock Index Futures Contracts -

- On March 2, 1988 the CME Board of Governors set the initial speculative margin requirement for the S&P 500 futures contract at 15 percent of the contract value. The margin increment was effective March 8, 1988 and it increased the margin requirement to $19,000 from $15,000 per contract (an amount set in mid-December 1987). In the volatile mid-October period the Board raised margins on this contract four times from $7,500 to $20,000 per contract.

- The Board indicated that on a routine basis initial margin will be reviewed and adjusted at least once each quarter to approximately 15 percent of the contract's value.

- As of March 2, 1989, the CME Board of Governors set the initial speculative margin requirements at $15,000.

Exhibit V

Post October 1987 Daily and Opening Price Limits - S&P 500 Stock Index Futures Contracts -

October 1987 to October 1988

Daily Price Limits -- S&P 500 futures and futures options contracts

"From October 23, 1987 to March 25, 1988, 30.00 point daily price limits were in place. Effective March 28, 1988, the level of the futures daily price limit is announced prior to the opening of trading in each calendar month. This limit is based upon the settlement price of the lead month futures contract on the last business day of the preceding month according to the following table:

Lead Month Settlement Price	Daily Limit
0.00-275.00	15.00 index points
275.05-325.00	20.00 index points
325.05 and above	25.00 index points

There will be no limit in a contract on its last day of trading. ... There will be a suspension of trading in options on the S&P 500 futures when the lead futures contract is at its daily price limit as determined by a majority of the S&P Price Limit Committee. Such suspension will not apply, however, on an option's last day of trading."[13]

"Opening Price Limits: On Tuesday, April 19, an opening limit of 5.00 index points was implemented for the S&P 500 futures contract. Briefly summarized, the new rule states that during the opening range there will be no futures trading at a price more than 5.00 index points above or below the previous day's settlement price. If triggered on the opening, the 5.00-point limit will remain in effect for the first 10 minutes of scheduled trading or until the contract trades off the 5.00-point limit after the opening range, whichever occurs first. If the contract trades off the opening limit, the daily limit of 15.00, 20.00 or 25.00 index points becomes effective."[14]

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[13] Excerpted from Equity Index Insights, "Recent Developments in CME Stock Index Futures and Options", May 3, 1988.

[14] Excerpted from Equity Index Insights, "Recent Developments in CME Stock Index Futures and Options", May 3, 1988.

October 1988 to Present[15]

On Tuesday, October 20, 1988, the former price limits for the S&P 500 futures and options were replaced with a system of shock absorber and circuit breaker price limits and trading halts coordinated with the NYSE and, in the case of circuit breakers, throughout all U.S. equity-related markets. The price limit levels were selected to correspond with particular point drops in the Dow Jones Industrial Average (DJIA). There are two shock absorber and two circuit breaker limits as follows:

Shock Absorber Limits

1. Opening Price Limit - Five (5) Index Points

   During the opening, the price of the S&P futures contract can move no more than five index points, up or down, from the previous day's settlement price. If the lead month contract becomes locked limit up or limit down during the opening, the limit will be in effect for a 10 minute period. If trading moves away from the limit price during this 10 minute period, the opening limit will no longer apply. If at the end of the 10 minute period the market remains at locked limit, trading will halt for two minutes. At the end of this two minute halt, trading will resume with a new opening range. The opening limit triggers no coordinated activity on the NYSE.

2. Intermediate Price Limit - 12 Index Points

   Following the completion of the opening period, a 12 point downward price limit will be in effect. If the lead contract reaches locked limit offer (locked limit offer occurs when there are no bids to buy except at prices lower than the limit price) at any point before 2:30 p.m. Chicago time, the 12 point limit will be in effect for 30 minutes or until 2:30 p.m., even if a trade occurs off the limit during this period. This limit does not apply in a rising market. Also, S&P options trading will cease at the time the futures contract becomes locked limit offered.

   A drop of 12 S&P futures index points approximates a 100 point drop in the DJIA. At the beginning of such a 30 minute limit period, the CME will notify the NYSE and the public. The NYSE will activate its new program for isolating program trades from its automated order entry system and collect program trades for a period of five minutes.

   At the end of the collection period, order imbalances will be evaluated. For the top 50 stocks, in terms of capitalization, order imbalances of less than 50,000 shares will be ignored and the orders will be filled. If any of the top 50 stocks have order imbalances of more than 50, 000 shares, trading will halt and a new opening will occur according to the "expiration Fridays" opening procedures. For stocks other than the top 50, the

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[15] Information on the coordinated shock absorbers and circuit breakers taken from CME Special Executive Reports, October 19, 1988, Description of New Program Regarding Price Limits and Trading Halts in S&P 500 Futures and Options, and October 17, 1988, Questions and Answers... Regarding Price Limits and Trading Halts in S&P Futures and Options, and a CME pamphlet entitled Description of Proposed Coordinated Circuit Breaker Initiatives.

specialists may either fill the orders or stop trading depending upon the magnitude of the imbalance.

Circuit Breaker Limits

1. Intermediate Circuit Breaker Price Limit - 30 Index Points

Upon expiration of the 30 minute time period associated with the 12 point price limit, a new price limit of 30 index points will become effective. Whenever the lead futures contract becomes locked limit offered at 30 points under the previous day's settlement price, trading in the S&P 500 options will be suspended; this limit does not apply in a rising market. If the DJIA has not dropped 250 points on the day, neither trading in the cash market nor in the S&P 500 futures will be halted; it will still be possible to trade futures off the limit.

If the DJIA reaches 250 points down from the previous day's close and the S&P 500 futures are locked limit offered at 30 points down, trading in all of the U.S. equity-related markets will be halted for one hour. At the end of the one hour trading halt, the markets would reopen with a new price limit of 50 futures index and 400 DJIA points in effect. The S&P futures market will reopen according to normal opening procedures at such time as 50 percent (by capitalization) of the S&P Index has reopened in the cash market.

The futures market will not reopen if the one hour trading halt is called within 30 minutes of the normal market close. If more than 30 but less than 60 minutes remain in the normal trading session, the S&P Price Limit Committee and the CME Executive Committee may decide in favor of a limited reopening to establish a settlement price. If the limited reopening occurs, trading cannot take place at prices more than 50 index points above or below the previous day's settlement price.

2. Maximum Daily Circuit Breaker Limit - 50 Index Points

Upon reopening after a one hour trading halt precipitated by reaching the intermediate price limit of 30 points down, the price limit for the day will become 50 index points. Should the S&P futures become locked limit offered at 50 points, S&P options trading will be suspended. It will still be possible to trade futures off the limit unless the DJIA has also dropped 400 points on the day. The 50 point limit applies in both a rising and a falling market.

If the S&P futures are locked limit offered at 50 index points down and the DJIA is down 400 points from the previous day's close, there will be a two hour trading halt in the U.S. equity-related markets. The two hour halt and reopening procedures will follow those of the one hour halt described above.

If less than 60 minutes remain in the normal trading day when the two hour halt is called, the futures market will not reopen. If, however, between 60 and 120 minutes remain in the normal trading day, the S&P Price Limit Committee and the CME Executive Committee may again decide to briefly reopen the markets to establish a settlement price. In this case, trading can not occur more than 50 points above or below the previous day's settlement price.

Trading will not be halted unless both a 30 or 50 point drop in the S&P futures and a 250 or 400 point drop in the DJIA have occurred. These coordinated shock absorbers and circuit breakers were created to provide a stabilizing force in rapidly falling markets. During the severe market decline of October 1987, wide price swings limited the ability of the markets to disseminate meaningful market information and the ability of the participants to evaluate the market behavior. The hectic trading pace during a decline may also impede the ability of potential buyers to get their orders to the market. Temporary trading halts will provide a period during which information can be shared and evaluated and potential buyers found to take the other side of the market. This system is scheduled for review one year after implementation. Inter-market coordination such as these price limits and trading halts was recommended by the Brady Commission following the October 1987, market decline.[16]

[16] Report of The Presidential Task Force on Market Mechanisms, 1988, page 69.

Options on the S&P 500 Futures Contracts

The CME initiated options on its S&P 500 futures contracts in 1983. The buyer of a call (put) option has the right (but not obligation) to take a long (short) position of one S&P 500 futures contract at the option strike price. The writer has the obligation to assume one long futures position in the case of a put option and one short futures position in the case of a call option upon assignment by the CME Clearing House. Strike prices are set at 5.0 point intervals. The option contracts are quoted for trading purposes in terms of index points. Following the convention used for the underlying futures contract, each point has a dollar value of $500. Thus, a 2 point premium converts to a $1,000 payment by the buyer of the option. The minimum price change is .05 index point which has a value of $25 per contract.[17] Trading hours are 8:30 a.m. to 3:15 p.m. Chicago time (identical to the CME's S&P 500 futures contract).

Options contracts are established for all twelve calendar months. The quarter-end futures contract is the underlying instrument for each option contract month in that quarter. For instance, exercise of a January, February or March option contract results in short and long positions in the March S&P 500 futures contract. The last trading day for the quarter-end option contracts is identical to the underlying futures contract--the Thursday prior to the third Friday of the quarter-end month. Consequently, exercise of these options contracts results in effect in a cash settlement. The last day of trading for the non-quarter-end contract months is the third Friday of the contract month.

Exercise of an option on the S&P 500 futures contract results in futures positions for the exerciser and the assigned writer at the option's exercise price as of the next business day. An S&P option may be exercised on any trading day including the day the option contract

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[17] A trade may be executed at a price of .025 index point ($12.50 per contract) if the trade results in liquidation of options positions for both parties to the trade.

is purchased. Any short option position still open at the end of a trading day is subject to assignment of a futures position. Since such assignment will almost always be at a price adverse to the option writer, option writers are subject to margin requirements which are recalculated daily. Option buyers are free of margin requirements.

The CME Clearinghouse automatically exercises in-the-money quarter-end options on the expiration date unless the option holder instructs the Clearinghouse to the contrary (through its Clearing Member). Nonquarter-end option contracts, whose exercise results in open futures positions, are exercised by the Clearinghouse only upon receipt of exercise instructions.

Market Uses

Stock index futures contracts and options provide portfolio managers with rapid and relatively low-cost mechanisms to alter the risk profiles of their portfolios -- including major asset allocation shifts (for example, between equity and fixed income exposures or cash), and to facilitate investment of new fund inflows. They are also used by portfolio managers to try to enhance income above what would result from a straightforward pursuit of their portfolio's basic objective(s) through arbitrage strategies. Other participants focus activities on arbitrage trading while brokerage firms utilize these markets to hedge positions during market making and underwriting activities in equities, and to implement arbitrage strategies. As with other futures contracts, the low cost and ease with which stock index futures contracts can be shorted enhances their attractiveness to market makers and arbitrageurs.

Factors contributing to the use of stock index futures and options on futures include the institutionalization of savings (for example, the importance of pension funds and mutual funds) and the popularity of index funds. The emergence of such largescale participants as pension funds has created the need for deep markets and a mechanism to transact efficiently in "baskets" of securities since fund inflows are too large to deploy in single stocks. Meanwhile,

index funds which seek to emulate the performance of various market indices are by their very nature oriented toward trading "packages" of securities or the futures equivalent of packages (index substitution).

Prior to the October market break, program trading accounted for a significant amount of activity in the S&P 500 futures contract. The CME reportedly estimates that before October 19, index arbitrage accounted for 5 to 10 percent of daily volume in the S&P 500 contract.[18] The role played by program trading in the market break--notably stock index arbitrage and portfolio insurance--has been a controversial topic and it appears that a number of former practioners have curtailed or stopped program trading. In the aftermath of the October 1987 experience, several major firms announced that they, at least temporarily, would no longer execute proprietary account stock index arbitrage.[19] Moreover, it appears that the failure of portfolio insurance to perform up to expectations has sharply reduced its use by many pension funds. One report suggested that up to $20 billion of funds formerly engaged in index arbitrage has been pulled back and that $70 billion of pension fund money is no longer covered by portfolio insurance -- a decline estimated at two-thirds of previously covered funds.[20] Because of the prominence of the CME's stock index contract, the curtailment of these activities has taken a heavy toll on the trading of the S&P 500 futures contract. Chart I illustrates an estimate of the impact this has had on the contract's liquidity.

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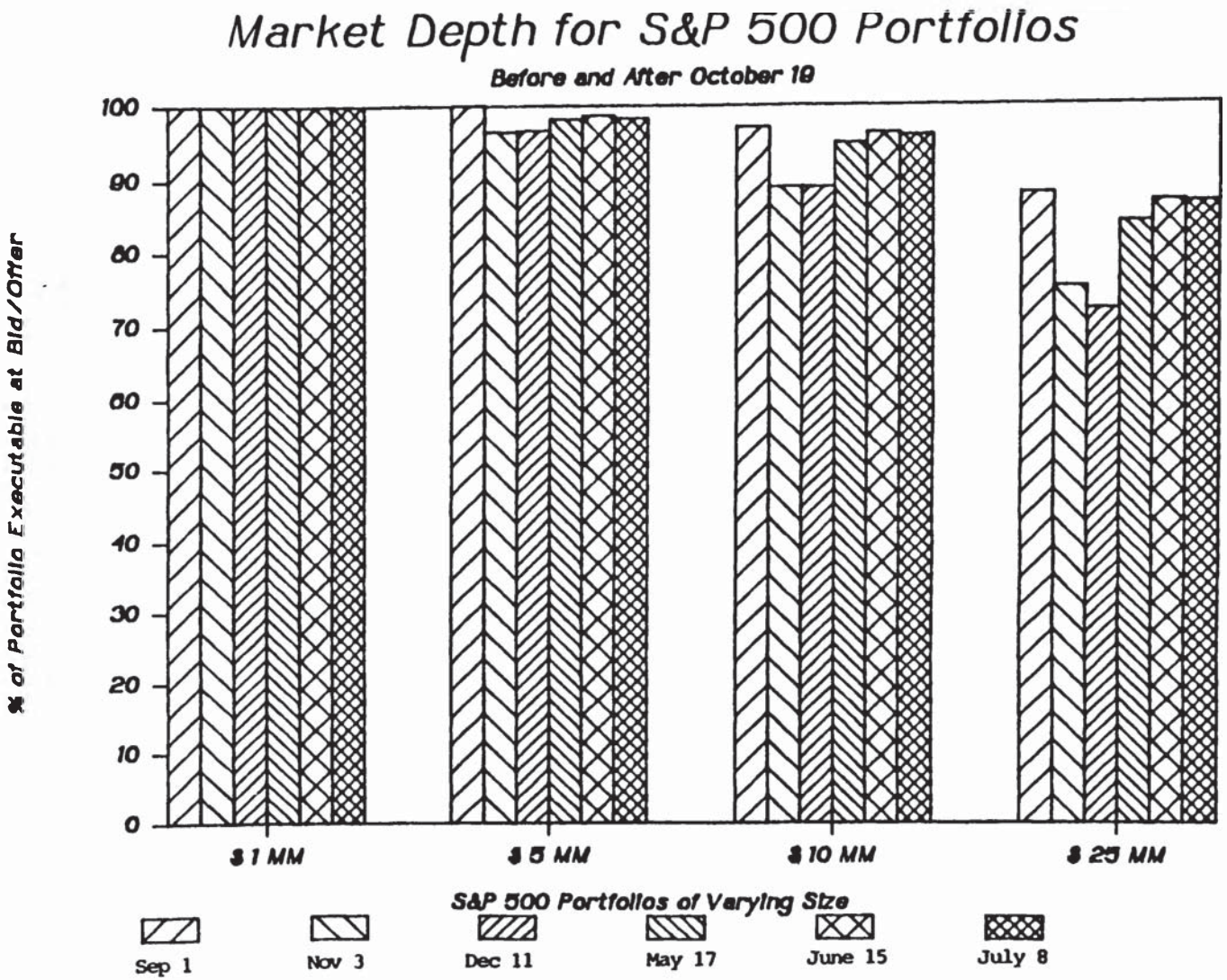
[18] "Program Trade Move Downplayed by Merc," New York Times, May 13, 1988 p. D4.

[19] Among the major firms were: Bear, Stearns & Company (which indicated that it also ceased executing orders for customers); Kidder Peabody & Company; Morgan Stanley & Company; Paine Webber Inc., and Salomon Brothers Inc. Several firms resumed program trading for their own accounts in 1989.

[20] Scott McMurray, "Chicago's Futures Markets Still Wobbling From Stock Crash" The Dow Jones Capital Markets Report, June 30, 1988 (Telerate Systems, July 1, 1988).

SOURCE: KIDDER PEABODY



Currency Futures and Options on Currency Futures

Currency Futures and Options Contract Specifications

The CME invented financial futures in 1972 when it established the International Monetary Market division and began trading futures contracts on foreign currencies. Currently, contracts are in place for the Swiss franc, Japanese yen, Canadian dollar, British pound, Deutsche mark, French franc, and Australian dollar. There is also a contract on European Currency Unit (ECU) which is currently inactive. Activity in the various currency contracts varies substantially but overall volume continues to grow. For example, in the January-May period in 1988 trading activity ranged from zero for ECU futures to 2.5 million contracts for Japanese yen futures. The other most active contracts were: the Swiss franc--2.1 million contracts; the Deutsche mark--2.0 million contracts; and the British pound--1.3 million contracts. Comparing 1988 with 1987, performance for these most active contracts was mixed with volume increasing for the Japanese yen, British pound and Swiss franc but declining for the Deutsche mark.

All of the foreign currency futures contracts are quoted in American terms--that is, in U.S. dollars per contract with the contract size denominated in terms of various amounts of the specific foreign currencies (see Exhibit VI). Similarly, the minimum price fluctuation measured in basis points and U.S. dollars also varies.

The other contract specifications of the currency contracts are mostly identical. They share the same contract months--January, March, April, June, July, September, October, December and the spot month. All contracts have no daily price limits and commence trading at 7:20 a.m. Chicago time. The last day of trading for all of the currencies is the second business day before the third Wednesday of the contract month. While all the currency futures begin trading each day at 7:20 a.m. the currencies close trading sequentially starting at

1:16 p.m. Chicago time. A similar sequential close of trading is used on the final day of trading but with the sequence beginning at 9:16 A.M. Chicago time (see Exhibit VI).

The 7:20 a.m. opening for currency futures was chosen to enable trading just prior to the release of many important U.S. economic statistics which are released at 7:30 a.m. Chicago time. The most important of these data releases for the FX markets have been the monthly U.S. trade data. In fact, the price fluctuations in response to some of these data releases have been so large that the CME has imposed special opening price limits for currency futures on days when important 7:30 a.m. releases occur (Exhibit VII). If the opening limits are hit, trading of the related CME options on currency futures is also temporarily suspended.

The IMM also has five active options on foreign currency futures. These are options on currency futures in Japanese yen, Deutsche marks, British pounds, Swiss francs and Canadian dollars. In all cases the underlying is one CME currency futures contract in the respective foreign currency.

Exhibit VI

Currency Futures Specifications

Currency Future (contract size--foreign currency units)	Close of Trading Daily(p.m.)/Last Day(a.m.)*	Minimum Price Fluctuation Points/$ Value
Swiss Franc (125,000)	1:16/9:16	1 point/$12.50
Australian Dollar (100,000)	1:18/9:17	1 point/$10.00
Deutsche Mark (125,000)	1:20/9:18	1 point/$12.50
Canadian Dollar (100,000)	1:26/9:21	1 point/$10.00
British Pound (25,000)	1:24/9:20	5 points/$12.50
New British Pound (began with Sept. 88 contract) (62,500)	1:24/9:20	2 points/$12.50
Japanese Yen (12,500,000)	1:22/9:19	1 point/$12.50
French Franc (250,000)	1:28/9:22	5 points/$12.50
ECU (125,000)	1:30/9:00	1 point/$12.50

* Central time.

Exhibit VII

Currency Futures Opening Primice Limits*

Special Opening price limits from the opening of currency futures and options markets at 7:20 A.M. (Chicago time) until 7:35 A.M.

- special limits are in effect only when 7:30 A.M. (Chicago time) government releases are scheduled
- if a contract is constrained by its opening limit at 7:35 A.M., trading is to be halted and a new opening will be initiated
- trading of options on these contracts will cease while the futures contracts are at their limits
- the currency futures contracts are not subject to daily price limits

The special opening price limits are:

Japanese yen	150 basis points
Swiss franc	150 " "
Deutsche mark	150 " "
Australian dollar	150 " "
Pound sterling	400 " "
Canadian dollar	100 " "

* Implemented May 17, 1988.

Option contract months are the March quarterly cycle which provide the right to buy (call) or sell (put) one futures contract in the corresponding quarter-end contract month, and serial month options which have as their underlying the futures contract which is the next futures contract in the March quarterly cycle. Therefore, for any futures contract month, there are as many as three options with the same underlying. For example, a March futures contract can be the underlying for up to three options contract months--one expiring in January, one in February and one in March. Such options having the same strike price will have the same intrinsic values but different time values and price (premium) sensitivities to the underlying's price and volatility (that is, different deltas, gammas and thetas). In this example, when the January option expires, an April option would begin trading with a June futures contract as its underlying and leaving the March futures as the underlying for February and March currency options. Options contracts expire two Fridays before the third Wednesday of the contract month. Daily trading times correspond to those of the underlying currency futures. Exhibit VIII presents selected specifications for the currency options contracts.

CME currency options may be exercised on any business day by the holder of a long position. The exercise process begins with the submission of an exercise notice by the long to the CME Clearinghouse by 7:00 p.m. The clearing system then randomly assigns a short futures position in the series exercised and produces a notice for both the long and the short involved. The next business day the options positions are removed by the Clearinghouse and a futures position is created in the relevant underlying currency futures contract at the exercised option's strike price. Subsequently that day, the futures position is marked to market using the day's settlement price (or exit price if the position is offset same-day), resulting in settlement variation debits and credits for the long and short clearing members.

Exhibit VIII

Selected Currency Option Contract Specifications

	Minimum Price Fluctuation Points/$ Value	Strike Price Intervals ($ per foreign currency unit)
Swiss Franc	1 point/$12.50	$.01 intervals e.g., $.45, $.46
Deutsche Mark	1 point/$12.50	$.01 intervals e.g., $.40, $.41
New British Pound	2 points/$12.50	$.025 intervals e.g., $1.450, $1.475
Japanese Yen	1 point/$12.50	$.0001 intervals e.g., $.0042, $.0043
Canadian Dollar	1 point/$10.00	$.005 intervals e.g., $.700, $.705
Australian Dollar	1 point/$10.00	$.01 intervals e.g., $.70, $.71

CME Currency Delivery Mechanism[21]

The CME implements currency deliveries by utilizing agent banks and their foreign branches. For some currencies the U.S. agent banks employ foreign bank correspondents which act under contract to the agent banks. This network of banks act on the CME's behalf

[21] This section draws heavily on "Clearing House Banking Interfaces" Chicago Mercantile Exchange, Clearing Division, White Paper Series (June 1988) pp. 17-21.

to: receive and make currency payments in U.S. dollars and foreign currencies; provide overdraft facilities to the CME in U.S. dollars and foreign currencies; and absorb credit risks during the time interval between delivery of foreign currencies and receipt of U.S. dollars which arise because of time zone differences between the U.S. and the foreign currencies' countries of origin.

The lag between the delivery of foreign currencies and the receipt of U.S. dollars exposes the delivery mechanism to exchange rate risk as well as the credit risk inherent in any transaction. The degree of exchange rate risk is similar to that encountered in normal "spot" foreign exchange transactions which by market convention settle two business days after the trade date. The CME's currency futures contracts stop trading on a Monday with delivery on Wednesday. Meanwhile, arbitrage should force the future's final settlement price to equality with the spot price quoted at the close of futures trading on that day. Therefore, per $l million of transaction, the exchange rate risk resulting from counterparty nonperformance is similar to that in spot trading.

All payments and receipts of currencies involve transfers between the accounts of banks domiciled in the country of the currency being transferred (except the ECU which does not have a home country and where transfers may be between countries with ECU denominated deposits). Currently, four U.S. banks (and their foreign branches) and five foreign banks under contract to the U.S. banks are involved in the delivery process for the various currencies (see Table 1).

Two distinct transactions are involved in a currency delivery. First, the short clearing member or customer makes delivery of the foreign currency to the agent bank's foreign branch (or the agent's correspondent bank) in that currency's resident country. Upon this receipt, the CME becomes obligated to deliver to the short clearing member or customer the

equivalent U.S. dollar value as determined by the respective future's contract settlement price. Payment is made to the U.S. bank account specified by the short. Second, the long clearing member or its customer makes the required U.S. dollar payment in full--or, more typically, arranges for an Exchange-approved bank to guarantee the requisite dollar payment via the issuance of an "Order to Pay"--to the appropriate agent bank. Upon this receipt, the CME is obligated to deliver the underlying currency to the long's specified account in the country of domicile for the currency.

Table 1

Currency	Agent Bank	Foreign Funds Transfer
Deutsche Mark	Citibank	Citibank's Frankfurt branch
Yen	First National Bank of Chicago	Dai-Ichi Kangyo Bank, Ltd.
Swiss Franc	Continental Illinois National Bank and Trust Company	Union Bank of Switzerland (Zurich)
French Franc	" "	Continental's Paris branch
Canadian Dollar	" "	Bank of Montreal (Toronto)
ECU	" "	Krediebank (Brussels)
Australian Dollar	" "	Commonwealth Bank of Australia (Sydney)
British Pound	" "	Bank of America's London branch

The Delivery Process

Deliveries against CME currency futures contracts occur on the third Wednesday of March, June, September and December. In each case, this is two days after the last day of futures trading. The steps involved in delivery are outlined below.

Last Trading Day

10:45 A.M. (Central time)

Each Clearing Member reports its final positions to the Clearinghouse by telephone.

11:00 A.M. (Central time)

Each Clearing Member submits to the Clearinghouse delivery commitments for all of its long (buyers of foreign currency) and short (sellers of foreign currency) customers. These commitments indicate the banks and account numbers from which or to which foreign currencies and U.S. dollars will be transferred for value Wednesday. The currency delivery subsystem conveys this information to the agent banks. In turn, the agents telex the necessary transaction data to their foreign branches or correspondents to prepare them to make or receive the appropriate foreign funds transfers on the value date.

Tuesday

3:00 P.M. (Central time)

The deadline by which the longs (buyers of foreign currency) must either: (1) make U.S. dollar payment in full or (2) have their banks submit to the

agent bank an "Order to Pay" for the U.S. dollar amount due. Orders to Pay account for more than 99 percent of the total U.S. dollar value of deliveries. If neither payment nor an Order to Pay is received, the foreign currency received from the short and intended for the nonperforming long is held by the agent bank as collateral against the overdraft in the CME's dollar account which results from meeting the CME's obligation to pay U.S. dollars to performing shorts.

Wednesday

10:00 A.M. (local time–country of domicile for the currency)

The agent bank's branch or foreign correspondent receives foreign fund transfers for credit to the CME delivery account. During the day the agent bank makes deliveries of the foreign currency to those longs who have made full payment in U.S. dollars or submitted Orders to Pay. In the case where a foreign correspondent is involved, the funds transfers involve credits and debits to the agent bank's account with the correspondent on behalf of the appropriate CME delivery account.

Deliveries are made to all longs who have performed regardless of whether shorts have made the contracted foreign funds transfers. If the short fails to perform, the agent bank uses the U.S. dollars intended for the seller to collateralize the foreign currency overdraft in the appropriate delivery account. Because of time zone differences, the initial collateralization would be in the form of Orders to Pay in most cases. In this most common case the agent bank incurs the credit risk that the

customer's bank will be unable to make good on the Order-to-Pay should the customer fail to perform.[22]

During the day in the U.S. the longs' banks must make U.S. dollar payments in accord with their Orders to Pay into the appropriate CME delivery account at the agent bank. The agent banks will also be making U.S. dollar payments to shorts which have met their foreign currency delivery obligation to the pertinent delivery account. The agents banks may either turn around U.S. dollar payments or go into daylight overdraft depending upon the timing of the payment flows.

These U.S. dollar payments have been running $7-10 billion in recent years. The CME has expressed concern over the effects of Federal Reserve debit caps, internal wire transfer queuing mechanisms at money center banks, and the effects of these constraints on days when CME delivery dates (Wednesdays) correspond to maintenance period settlement dates.[23]

As noted above, payments of U.S. dollars and foreign currencies by performing parties are utilized to collateralize overdrafts incurred by CME delivery accounts if funds available are insufficient to meet CME obligations because of nonperformance by longs or shorts. Ultimately, these funds would be used by the agent bank to cover the cost of "buying in" the needed U.S. dollars or foreign currency. If insufficient, the margin deposits of the failing long or short clearing member would be utilized. Margin deposits are not released until confirmation

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[22] "Clearing House Banking Interfaces," pp 18-19.

[23] "Clearing House Banking Interfaces," pp. 20-21.

of the required delivery. The Clearing House has the authority to sanction clearing members for technical one-day failures to perform. Such technical failures occur on less than one-half of one percent of deliveries.[24]

[24] "Clearing House Banking Interfaces," p.2l.

III. Participants

Access to the floor of the CME for trading purposes is limited to members of the Exchange and those with temporary access. Participants can be members of the CME, the IMM or the IOM and there are specific privileges and responsibilities associated with the respective categories of membership. Other participants may have temporary access to the floor of the Exchange if issued a Trading Permit by the Exchange.

Other participants include clearing members or those qualified to clear transactions on the exchange. These participants fall into the categories of CME and IMM Class B clearing members. Commodity representatives, or those acting as sales representatives and Futures Commission Merchants (FCM) are also participants elaborated on in the following section.

In all cases, members, clearing members and other participants have specific guidelines to be adhered to under rules and procedures established by the Chicago Mercantile Exchange and the regulatory authorities.

Membership[25]

Membership in the CME and its Divisions is currently limited to 625, while membership in the IMM and IOM Divisions is limited to 812 and 1,287 respectively. Any adult of good moral character, reputation and business integrity, with adequate financial resources and credit to assume the responsibilities and privileges of membership, is eligible for election to membership in the CME. Moreover, a person elected to membership agrees to be responsible for any violations of Exchange rules. An official register, maintained by the Membership Department of the Exchange, consists of a list of member's names and addresses and serves

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[25] Source: Consolidated Rules of the CME and the IMM Division and IOM Division (as of June 30, 1988).

as proof of membership. A person may register more than one membership each for the CME, IMM or IOM.

To facilitate the sale of a membership, the seller must sign and file with the Membership Department an "offer to sell" which states an offering price and also contains an agreement to the conditions of the sale. Upon completion of the sale of membership, all privileges originally bestowed on the seller are terminated and the seller is ineligible for new membership in the same Division for six months unless the Board of Governors grants a waiver.

To facilitate the purchase of a membership, the prospective buyer (as with the seller) must sign and file with the Membership Department an "offer to purchase." This document may either be guaranteed by a Clearing Member of the Exchange or by the deposit of a certified or cashier's check in the amount of the purchase price. The "offer to purchase" also contains an agreement by the purchaser to take no recourse against the Exchange should the application for membership be rejected (except as provided in Section 8c of the Commodity Exchange Act). A membership can also be financed in which case appropriate papers must be filed with the Membership Department.

The lowest offer to sell and the highest bid to buy a membership are posted by the Membership Department. The Department matches bids and offers and promptly notifies both the buyer and seller in the event of an agreement. Within two business days of the notification, the buyer deposits with the Department a check for a transfer fee (amount set by the Board) and a certified or cashier's check (if not previously deposited) in the amount of the purchase price. (The Exchange does not guarantee return of the purchase price if the applicant is rejected; the membership can be resold through the normal process.) The purchaser then files an application for membership which includes: an agreement to take no recourse against the Exchange in the event of a rejection of the application (as previously outlined); the financial

arrangements made in connection with the proposed purchase; an agreement to abide by the rules and regulations of the Exchange; and an acceptance of the burdens and risks inherent in the application.

Upon completion, the Department notifies the full membership by mail and by posting for 20 days a of the name of the applicant, the seller and the purchase price. This notice requests that members submit to the Department any claims against the seller arising out of any Exchange futures or options transaction or relationship regulated by the Exchange. The Department also prepares a report outlining the qualifications of the applicant and submits it to the Membership Committee.

Memberships may also be exchanged for one another through a SWAP market. A SWAP is a direct exchange of membership whereby a member "trading up" exchanges his membership plus cash for a more valuable membership in a different division. A member "trading down" exchanges his current membership for one in another division plus cash. The SWAP market is conducted by the same rules and procedures that apply to the purchase of memberships as previously described.

A member who is not under suspension from trading may temporarily transfer his membership to another person. Members by transfer are also subject to all Exchange rules and regulations. Among the terms and conditions of temporary membership are that the transferor may revoke the transfer and may be reinstated, and that the transferor retains the right to have the transferee disqualified from trading by giving proper notice. The transferee is not authorized to sell, transfer or assign the membership. Other transfers available are through gifts or

bequests, between employees of Clearing Members, to entities wholly-owned by a member, and between employees of related parties[26]. Each such transfer is subject to Exchange rules.

The Membership Committee reviews all applications and accompanying documents and comments. It arranges a meeting with the applicant and then votes on the applicant's qualifications. Membership first requires a majority affirmative vote of the committee members present. Then the application and committee recommendation are submitted to the Board for consideration at its next scheduled meeting. Finally, a Board vote is required to elect the member. Election, in this case, is conducted by secret ballot, with at least 12 governors participating. If four or more negative votes are cast, the application is denied. A rejected applicant loses the processing fee and is also subject to risk of gain or loss from membership resale. The membership of a rejected applicant must be sold within 30 days. An applicant rejected by the Membership Committee has the ability to appeal based on new or additional evidence and an applicant rejected by the Board may file a petition for reconsideration subject to specific guidelines.

Privileges and Responsibilities

There are three categories of membership: CME, IMM and IOM. CME membership extends to all commodities; IMM privileges are limited to commodities in the IMM and the IOM; and IOM privileges to commodities within the IOM. The member has the following privileges within the member's Division:

- To appear on the Exchange floor during business days (if qualified by a Clearing Member)
- To vote at meetings of the Exchange, at elections and or referenda and to sign petitions (except for transfers of local memberships)

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[26] "Related party" is defined as including a firm that owns, directly or indirectly 100 percent of a clearing member or that has 100 percent ownership, direct or indirect, in common with a clearing member.

- To be qualified to act as a floor broker/trader
- To assign his membership to a corporation or partnership for clearing purposes.

Membership responsibilities include the payment of dues and special assessments, compliance with the Commodity Exchange Act and other rules issued by the CFTC, compliance with CME rules, and membership in CME Gratuity Fund (including payment of all fees and compliance with appropriate by-laws).

Involuntary sale of a membership can occur in several circumstances. The membership of a deceased or incompetent member may be maintained by a legal representative for one year. Within 30 days of the passage of the one-year period, however, the legal representative must arrange for the sale or transfer of the membership or it will be sold via auction. A member must respond within three business days to a notice of complaint by another member that he has failed or refused to perform a contract on the Exchange, or to pay an obligation arising from such contract. If the obligation is admitted or is not denied or is established by arbitration (in cases where the obligation was denied), continued failure to satisfy the obligation will result in the suspension of the member until the obligation is met. If the Board determines that a member or a firm with member privileges is in default upon any indebtedness or assessment due to the Exchange, the CME Gratuity Fund or the CME Club, or any indebtedness due to another member or to a clearing member arising out of Exchange contracts, the Board may order the membership sold with the proceeds applied toward the obligation.

The Exchange also authorizes and issues 250 Trading Permits (TP). These are available to all members as well as the general public, subject to approval of the Membership Committee and the Board of Governors. TPs are non-transferable and valid for one year from

the date a holder exercises trading privileges and can be renewed for an additional six months. TPs cost $6,000 per year ($700 non-refundable) and the six-month renewal costs $4,500 which is non-refundable.

TP holders must trade a minimum of 400 futures contracts per month (option trades are not applied toward this minimum). TP holders are eligible to execute trades for their own account in the following contracts:

Futures	Options
Australian Dollar	Australian Dollar
Gold	Canadian Dollar
Random Length Lumber	Gold
S&P 100	Random Length Lumber
	3-month U.S. T-bill

A TP holder, while on the trading floor, may enter written, time-stamped orders to be executed by members in any contracts on the Exchange. The TP holder pays non-member clearing fees for such transactions in contracts other than those just specified. A TP, however, has the following limitations:

- Conveys no equity to the holder at expiration
- Does not entitle the holder to voting privileges, membership on Exchange Committees or attendance at members' social functions
- Requires the holder to have minimum net capital of $25,000
- Does not entitle the holder to act as a floor broker.

TP holders are governed by the Permit Administration Committee which determines if they are in compliance with appropriate rules of conduct. The Committee has authority to suspend privileges and revoke the permit. Holders of TPs are subject to all the rules and regulations of the Exchange applicable to members.

Clearing Members[27]

There are two categories of clearing members on the CME: CME clearing members, and IMM Class B clearing members. CME clearing members are fully vested clearing members with all the appropriate rights, responsibilities and privileges. CME clearing members are qualified to clear transactions for all commodities.

IMM Class B clearing members are non-bank entities whose privileges and rights are limited to the sole purpose of conducting proprietary arbitrage in foreign currencies and the European Currency Unit (ECU) between a single Exchange-approved bank and the IMM. Such Class B members must be guaranteed by one or more CME clearing members.

A CME clearing member that maintains fewer than 16 branch offices and fewer than 32 branch offices and guaranteed introducing brokers combined, shall have a minimum of two CME memberships, two IMM, and two IOM memberships assigned to it. If 16 or more branch offices or a combination of 32 or more branch offices and guaranteed introducing brokers are maintained, the clearing member must do one of the following: have one additional CME or IMM membership assigned to it, have three additional IOM memberships assigned to it, or deposit with the Clearinghouse additional Treasury securities with a market value of $500,000. A membership of higher value may always be substituted for one of lower value when meeting these requirements. A CME Class A clearing member must, at all times, maintain at least one membership assigned to it in the name of a senior officer, partner or director who is authorized to represent the clearing member before the Exchange and its committees. The Clearinghouse Committee shall approve this assignment.

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[27] Consolidated Rules, Chapter 9.

An applicant for an IMM Class B clearing membership shall be a non-bank entity. One or more CME, non-bank clearing members must guarantee and assume complete responsibility for all of the Class B member's trades. The applicant must be engaged in or demonstrate immediate capacity to engage in arbitrage with a single Exchange-approved bank. For each arbitrage account, a new Class B membership must be established and approved by the Clearinghouse Committee. A Class B clearing member must maintain a minimum adjusted net capital of $50,000. The Clearinghouse Finance Sub-Committee shall maintain the right to prescribe minimum financial requirements for all IMM Class B clearing members in excess of those established within CME rules.

In addition, every clearing member must maintain financial capitalization in accordance with standards set by the Clearinghouse Finance Sub-Committee. The criteria used to determine financial capitalization include types and number of open positions carried (customer versus house, hedge versus speculative), margin policies, nature of business conducted, and such other criteria as deemed necessary by the Clearinghouse Finance Sub-Committee.

Commodity Representative

A commodity representative is a person registered with the National Futures Association as an Associate Member whose sponsor is a member of the Exchange and who is engaged to act as a sales representative for commodities dealt in or listed on the Exchange. The commodity representative shall be bound by the rules of the Exchange to the same extent as if he were a member.

The sponsor of a commodity representative shall be responsible to the Exchange for the acts of its commodity representative, and any violation of Exchange rules. It is also the duty of the sponsoring clearing member to supervise the commodity representative's compliance

with Exchange rules. Moreover, a qualified commodity representative shall not act for more than one Clearing Member at any one time.

FCM Members

Every clearing member who is a registered Futures Commission Merchant (FCM) is subject to the following requirements. Each FCM must file a Form 1-FR, at least semi-annually, or as otherwise requested by the Exchange and once a year it must be certified by a CPA. Each form must be completed in accordance with 1-FR instructions and contain a statement of Financial Condition, a Statement of Changes in Ownership Equity, a Statement of Computation of the Minimum Capital Requirements, a Statement of Segregation Requirements and Funds in Segregation, and a Statement of Secured Amounts and Funds Held in Separate Accounts. FCMs must meet minimum adjusted net capital requirements equal to or exceeding the greater of $50,000 or 4 percent of segregated funds by the market value of options purchased.[28]

Any FCM member who is not in compliance with these minimum financial requirements must transfer all customer accounts and immediately cease doing business as an FCM until such time as the member FCM is able to demonstrate such compliance.[29]

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[28] "Each FCM must maintain adjusted net capital equal to or in excess of the greater of $50,000, or 4 percent of the funds required to be segregated pursuant to the Commodity Exchange Act less the market value of commodity options purchased by option customers on or subject to the rules of the contract market, provided, however, the deduction for each option customer shall be limited to the amount of customer funds in such option customer's account, or for Securities Brokers and Dealers, the amount of net capital required by Rule 15c3-1(a) of the regulations of the Securities and Exchange Commission (17CFR 240.15c3-1[a])." This specifies the minimum capital consistent with Consolidated Rules Chapter 9, Section 985. However, the current practice of the Clearinghouse committee is to require adjusted net capital of at least $1.5 million.

[29] The member FCM may trade for liquidation purposes only, unless otherwise directed by the Exchange.

Any member FCM who knows or should have known that its adjusted net capital at any time is less than the minimum required must give telegraphic notice to the Exchange of this condition within 24 hours after it is known. Then, within 24 hours after giving such notice, the member FCM must file a Statement of Financial Condition, a Statement of Computation of Minimum Capital Requirements, a Schedule of Segregation and Funds on Deposit in Segregation, and a Statement of Secured Amounts and Funds Held in Separate Accounts -- all as of the date such member FCM's adjusted net capital is less than the minimum required.

IV. GOVERNMENT OF THE CHICAGO MERCANTILE EXCHANGE

The Chicago Mercantile Exchange is governed by (1) an elected Board of Governors, (2) elected and appointed committees and (3) salaried officials of the Exchange, engaged by the Board.

A. Powers and Duties

Board of Governors

The Board, nominated by Committee or petition, for two year terms are elected by members of the Exchange in good standing. The Governors number 31 individuals and are composed of: (a) 12 CME members, (b) 8 International Monetary Market (IMM) members, (c) 4 Index and Option Market (IOM) members. In addition 3 non-member governors and 3 representatives of the futures and options industry, as well as, a special counsel are appointed by the Chairman and approved by the Board.

The Board of Governors elect from among themselves a Chairman, First and Second Vice Chairman, Secretary and Treasurer for a one year term. A Chairman may exercise the power of that office for only three consecutive years. The Chairman appoints all committees, presides at all Board meetings, executes all contracts authorized by the Board and oversees the annual audit of the books of the Exchange.

The Executive Committee consists of a minimum of 12 Board members including the Chairman of the Board, First and Second Vice Chairman, Secretary and Treasurer, "the immediate three past chairmen of the Board (all of whom must be presently serving an uninterrupted term on the Board)," the Special Counsel and three IMM and one IOM Governor appointed by the Chairman. The Special Counsel serves for two years as the Executive Committee Chairman.

The Board of Governors meets at least twice monthly, and during the intervening periods the Executive Committee is vested with the authority of the Board to manage the Exchange. All actions taken by the Committee in times of an emergency are final, and other actions are referred to the Board for approval at its next meeting.

The Rules of the Exchange vest the Board of Governors with twelve powers and duties involving:

- property
- appointments
- contracts
- membership
- conduct of hearings
- ability to determine commodities traded and the contract specifications, and
- making or amending the Rules of the Exchange

The Board's most significant powers are those provided for in an emergency. An emergency exists if the Board determines that a "free and orderly market in a commodity is likely to be disrupted or the financial integrity of the Exchange is threatened or the normal functioning of the Exchange has been or is likely to be disrupted." In such cases, upon a two-thirds vote of members present or two thirds vote of members polled the Board may take such action as it deems necessary, including:

1. Terminate trading.
2. Limit trading to contract liquidation only.
3. "Order liquidation of all or a portion of a member's proprietary and/or customer accounts.

4. Order liquidation of contracts for which a holder is unwilling or unable to make or take delivery.

5. Confine trading to a specific price range.

6. Modify trading days or hours.

7. Alter conditions of delivery.

8. Fix the settlement price at which contracts are to be liquidated.

9. Require additional margins to be deposited with the Clearinghouse.

Exchange Officers and Employees

The President of the Exchange is employed by the Board and is "in charge of the business of the Exchange and all employees."[30] The Executive Vice President is hired by the Executive Committee to assist the President and to "coordinate and supervise all normal administrative functions of the Exchange." Vice Presidents are engaged by the Executive Committee to perform specific functions designated by the President. The Assistant Secretary is hired by the President and performs specified duties. Employees of the Exchange are prohibited from:

1. Trading any commodity contract on any contract market or securities option contract closely related to a contract traded on the Exchange.

2. Accepting gifts in excess of $25.00 annually from members or vendors, without prior approval.

3. Disclosing material non-public information.

4. Purchasing or owning a membership on the Exchange (The Executive Committee may allow exceptions from this rule.)

5. Being employed by a member of the Exchange.

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[30] All quotations in Section IV and V which are not individually cited are from the "Consolidated Rules of the Chicago Mercantile Exchange and the International Monetary Market Division and the Index and Option Market Division" by The Chicago Mercantile Exchange, June 1987 or "Clearing House Manual of Operations" by The Chicago Mercantile Exchange, July 1988.

Violations of the above rules result in "immediate dismissal" of the employee. Members who cause or are aware of employee violations of these rules and who do not notify the President of the Exchange may be guilty of a "major offense".[31]

The President of the Exchange also is vested with power to take action, including the suspension of trading, in an emergency whether the cause is physical (e.g., bomb threat, power failures) or financial. A financial emergency exists when the President (or, in his absence the Executive Vice President, Senior Vice President of the Clearinghouse or the Senior Vice President for Legal and Regulatory Affairs)" determines that the financial condition of any clearing member is such that its continued operation would jeopardize the integrity of the Exchange." In responding to the emergency, the President may require, depending upon the situation, additional margin, emergency intraday variation margin, member suspension, and liquidation or transfer of trades.

Rules

The Board is empowered to make and change the rules of the Exchange subject to approval by the Commodity Futures Trading Commission (CFTC). Typically, a new rule or a change is assigned to the appropriate committee for deliberations and recommendations prior to Board approval. Exchange members are normally notified of proposed rule changes 5 days prior to submission to the Commodity Futures Trading Commission for approval or the effective date.

Members of the Exchange, however, maintain the right to amend or repeal rules through referendum, requiring the signatures of 350 members to a petition and a special ballot arranged by the President. On the day following members are notified of the outcome.

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[31] Major offenses will be elaborated on in the Enforcement of Rules section.

Bank Accounts

The Exchange must maintain and apportion its bank accounts "among at least three Chicago banks." Account types included are: (1) Security deposit, (2) Clearing House, (3) General, (4) Payroll, and (5) Delivery. Surplus funds in the Clearing House or General account may be invested by the Board in U.S. Treasury bills, bonds or notes, or in certificates of deposit of certain banks. In addition, the Exchange, maintains "with one or more Chicago banks," safekeeping accounts for the deposit of U.S. government securities.

B. Exchange Committees

The Chicago Mercantile Exchange maintains four types of committees: (1) Standing, (2) Coordination, (3) Select Board and (4) Ad Hoc. The duties of each committee are to investigate, advise, and assist the Board in the business area assigned to it. There are 32 standing committees[32] focusing on specific business considerations of the exchange.

There are five coordinating committees[33] each of which is responsible for the coordination of committees with related or overlapping duties. Included in this category are the Agricultural and Financial Instruments Steering committees which seek out and recommend to the Board additional types of commodities for trading as well as approve all advertising and marketing plans for their specific areas. In addition, the International Steering Committee

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[32] ACFX (American Coalition for Flexible Exchange Rates), Approved Delivery Facility, Arbitration, Building Improvement and Real Estate, Business Conduct, Clearing House, Commodity Committees, Commodity Representative/Customer Complaint, Contributions, CTR (Computerized Trade Reconstruction). Education, Executive, Finance, Floor Broker Qualification, Floor Communications, Floor Orientation, Floor Practices, Floor Services, Leasing, Member Services, Member Space Allocation, Membership, New Market Floor Promotion, Nominating, Pit, Pit Committee Supervision, Pit Trading Oversight, Probable Cause, Public Affairs, Restaurant and Club and S&P Oversight.

[33] Agricultural Steering, Facility Coordination, Financial Instruments Steering, International Steering and Member Coordination.

investigates and advises the Exchange on its "general international presence." This Steering committee "directs the activities of CME international offices and their staff."

The two Select Board Committees involve Auditing and Strategic Planning.

Normally, nine Exchange members are appointed to the different committees by the Chairman of the Board of Governors with Board approval. The Board also has the power to remove committee members. Committee appointments are coterminous with the Board Chairman's term of office. Chairmen of all Standing Committees other than the Nominating Committee vote in committee only as tie breakers. The Chairman of every standing committee, "except for the floor Chairman of the Pit Committees and the Chairman of the Nominating Committees" is a member of the Board of Governors. This affords the Chairman and the Board of Governors a significant ability to direct and control present and planned activities on the Exchange.

C. Enforcement of Rules

While the Board of Governors adopts rules for the Exchange, the enforcement of these rules has been delegated to the Vice President of Compliance, Vice President of Market Surveillance, Vice President of Audits and Senior Vice President of the Clearinghouse and to six standing committees which investigate and conduct hearings to determine if a member or clearing member has committed a major or minor offense and what the appropriate penalty should be.

Offenses

Major offenses[34] of exchange rules are punishable by expulsion, suspension and/or a fine of no more than $250,000 "plus the monetary value of the benefit received." Major offenses include, for example, extortion, market manipulation or failure of a clearing member to maintain minimum financial requirements.

Minor offenses[35] of exchange rules are punishable by not more than $25,000 in fines plus the monetary value of any benefit derived from the offense. An example of a minor offense is "making a false entry on a clearing sheet." If a member commits the same minor offense twice within 2 years, the penalty will be equal to that of a major offense.

Vice President of Compliance and Audits

This individual is responsible for enforcing the rules of the Exchange. At his disposal is the Department of Compliance and Audits which "conducts investigations of rule violations and market conditions." His authority extends to the inspection of members' books and records as well as requiring members "to appear before him" to answer questions regarding violations.

Investigative and Hearing Procedures

The Department of Compliance and Audits is empowered to begin the investigation of rule infractions. An investigation must be completed within four months unless circumstances exist to extend it beyond that time period. The Department's report contains the

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[34] See Appendix A for other examples of major rule violations. (There are many other rules which, if violated, are major and minor offenses. This section addresses itself only to the types of conduct described in Rule 432 and 433.)

[35] See Appendix B for other examples of minor rule violations. (There are many other rules which, if violated, are major and minor offenses. This section addresses itself only to the types of conduct described in Rule 432 and 433.)

reason for the investigation, a summary of the complaint, and all relevant facts as well as the Department's recommendation to: (a) issue a warning letter, (b) close the files or (c) refer to a committee with specific charges.

If the Department's report is presented to the Probable Cause Committee, this committee has 30 days from receipt to determine whether "a reasonable basis exists for the issuance of charges based upon a violation of rules of the Exchange." This committee is vested with powers similar to the Department of Compliance and Audit, in that it may compel any member, clearing member or member's employee to appear before it, as well as produce any relevant books or records. The Probable Cause Committee after its review, determines that: (a) a reasonable basis does not exist for issuing charges and no action is warranted, or (b) to issue a warning letter, or (c) to direct that "a member be served with a notice of charges" and designate an investigation and hearing committee to hear the matter. The decisions of this committee are by majority vote and are in writing.

If a member is served with notice of charges he has 10 days to respond in writing to the committee specified to handle the hearing or waive his right to a hearing. If rights are waived, he will be notified of the committee's decision within 3 days. The member served may be represented by counsel or a member, excluding members of the Investigation or Hearing Committee, the Probable Cause Committee, Board or employees of the Exchange.

The member's response to the notice of charges must include an admission or denial of the charges. Admission of all charges results in the hearing committee advising him of the penalty and the right to "request a hearing on the penalty within 10 days." If one or more charges are denied, the committee will consider penalties for charges admitted "at the same time the matters denied by the respondent are considered."

The hearing committee is empowered to compel attendance at hearings and require presentation of all relevant documents. "The Department of Compliance and Audits [is] a party to the hearing and [presents] evidence on the charges. The staff of the Department and the members of the hearing body may actively question any witness and examine all evidence. The member under investigation may appear personally, testify, produce evidence, call witnesses in his own behalf and may cross examine any witness. Formal rules of evidence [do not apply]." All testimony and documents are confidential, "a substantially verbatim record of the hearing [is] made and becomes part of the record of the proceeding."

After the hearing, the committee shall find the member guilty or not guilty. If found not guilty, the member will not be "charged with or tried for the same offense." In either case, the chairman of the hearing committee files a written report of the findings including penalties with the Vice President of Compliance and Audit, the respondent and the Chairman of the Probable Cause Committee.

Standing Committees

1. Business Conduct Committee

This standing committee is responsible for the supervision of members' business conduct. It has an Agricultural and a Financial Division. Each division has at least seven appointed members, five of whom are selected by the Chairman to vote on the issue under consideration. In addition, the Chairman of the Board will appoint one "public" or non-member governor to serve as a non-voting member in both divisions.[36]

The Business Conduct Committee also has emergency powers which it may employ if it determines that a situation exists which "threatens the integrity, liquidity or orderly

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[36] See Appendix C for Business Conduct Committee-Hearings and Penalties.

liquidation of any contract." To take these actions the committee must achieve a two thirds majority of committee members present. The Board of Governors and Commodity Futures Trading Commission must be advised of these actions.[37] Non-member trading violations,[38] member complaints and enforcement of speculative position limit rules[39] are also the purview of the Business Conduct Committee.

2. Clearinghouse Committee

This standing committee evaluates the qualifications of and establishes regulations regarding the qualifications of clearing members. The Clearinghouse Committee evaluates the applications of clearing members and applications "for assignment of membership for clearing purposes." Applications and assignments that are approved by this committee are submitted to the Board for final action and approval.

This committee has jurisdiction and enforcement powers regarding:[40]

a) the manner in which trades are cleared

b) the functioning of the Clearinghouse

c) the margin and financial integrity of clearing members and

d) the business conduct and compliance with rules and regulations of clearing members, not assigned to the Business Conduct or Commodity Representative/-Customer Complaint Committee

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[37] See Appendix D for Emergency Conditions and Actions.

[38] See Appendix E for Non-member Trading Violations.

[39] See Appendix F for Speculative Position Limit Rules and Penalties.

[40] See Appendix G for Clearinghouse Committee Hearings and Penalties.

The Clearinghouse Committee is also empowered to declare that an emergency exists when a situation occurs that "threatens the financial integrity of the Exchange or any of its members."[41]

3. Commodity Representative/Customer Complaint Committee (CR/CCC)

This standing committee consists of five members and five alternates, and the Chairman who is a governor of the Exchange. The CR/CCC is responsible for:

a) Establishing the qualifications of a commodity representative[42] for registration.

b) Supervising commodity representative rule compliance; and

c) Investigating non-member and customer complaints.

The CR/CCC conducts arbitration hearings regarding claims[43] or counterclaims[44] that occurred no more than two years past in which customers agree to submit themselves to the committee's findings as final and in which member counterclaims addressing the same transaction may also be reviewed. Counterclaims for $2,500 or less may be referred to the

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[41] See Appendix H for Clearinghouse Committee Emergency Actions.

[42] A commodity representative is an associate member of the Exchange who acts as a sales representative, must register with the National Futures Association and be sponsored by a member of the Exchange willing to be responsible for all of his acts.

[43] A claim is an "asserted right arising out of a futures transaction on or subject to the rules of the Exchange, including mutual offset rules, which does not require for adjudication the presence of essential witnesses or third parties over whom the Exchange has no jurisdiction or who are not otherwise available and does not require the application of the rules of another Participating Exchange."

[44] A counterclaim is a "claim which a member or member's employee has against a customer arising out of the transaction or occurrence that is the subject of the customer's claim or grievance..."

Department of Compliance and Audits for resolution. (This department provides a written report to the CR/CCC for its approval.)[45]

4. Floor Practices Committee

This standing committee is responsible for matters relating to floor practices and trading ethics. Like the Business Conduct Committee, it has an Agricultural and Financial Division. This committee also has the right to hold hearings which are conducted by the Chairman and five members.[46]

5. Pit Committee

This standing committee has jurisdiction over all "pit infractions" and is responsible for:

a) The supervision of opening and closing ranges.

b) The overseeing and enforcement of price changes.

c) The removal of unauthorized persons from the pit.

d) The resolution, "by immediate action [of] all grievances arising from price infractions during pit trading."

The Pit Committee is also responsible for the conduct of "summary proceedings" on violations and the assessment of penalties regarding "Trading Infractions."[47] Each member of this commit-

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[45] See Appendix I for a discussion of Customer Arbitration Proceedings and Actions.

[46] See Appendix J for Floor Practices Hearing Committee-Disciplinary Actions.

[47] "The following constitutes 'trading infractions': (1) a bid or offer out of line with the market; (2) a bid or offer which tends to confuse the other traders; (3) a price infraction; (4) failure to confirm a transaction; (5) failure of buyer and seller to announce a change in the last sale price and failure to ascertain that it is properly recorded; (6) use of profane, obscene, or unbusinesslike language on the floor; (7) use of undue force while in, entering or leaving the pit; and (8) conduct which tends to confuse, distract, abuse or intimidate any Exchange employee; and (9) conduct of an unbusinesslike nature."

the has the right to bring charges against an individual by filing them with the Department of Compliance and Audit and with the respondent.[48]

Appeal to the Board

Members or clearing members found guilty of an offense and displeased by the decision may within 10 days of the decision appeal to the Board of Governors.[49]

6. Probable Cause Committee

This committee reviews the Departments of Compliance and Market Surveillance investigation reports and determines whether "there is a reasonable basis to charge a rule violation" in most matters except for those regarding the Clearinghouse, Pit, Broker Association, Commodity Representative Committees and Floor Practices Committee as it relates to summary proceedings, and non-serious CTR (Computerized Trade Reconstruction) Committee matters. The Probable Cause Committee prepares and issues charges to members; however, it has no power with regard to emergency or rule enforcement powers of the investigative or hearing committee.

D. Arbitration or Litigation

If a dispute arises the Exchange expects members to use arbitration rather than litigation to resolve the matter. It monetarily encourages arbitration by requiring a member or clearing member to indemnify the Exchange for settlement or judgement amounts resulting from any legal proceeding brought against the Exchange by the member or clearing member for alleged violation of laws or rules of the Exchange. A member using the courts before

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[48] See Appendix K for a description of "Summary Proceedings."

[49] See Appendix L for Appeal Procedures to the Board of Governors.

exhausting arbitration procedures may be committing a major offense and be subject to fines, expulsion or suspension.[50]

E. Regulatory Authority

The Commodities Exchange Act established all futures exchanges as self-regulatory organizations (SRO). The CME has "adopted rules that (1) govern the conduct of trading, (2) govern the relationship between members and member firms and their customers, and (3) provide for financial integrity of the system. These rules, the regulatory staff and committees that enforce them and (the) various regulatory programs comprise the CME's Regulatory System."[51]

The Commodities Futures Trading Commission (CFTC) functions in an oversight capacity which takes many forms including: "evaluation through regular reviews of exchange financial, trade practice surveillance, market surveillance, disciplinary and sales practice programs; prescription of minimum SRO program standards...; intervention in emergency circumstances...enforcement actions, including actions against the SRO itself in some cases; and appellate or oversight review, including review of exchange rules and jurisdiction of appeals from exchange disciplinary actions."[52]

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[50] See Appendix M for discussion of the Arbitration Hearing and Appeals Process.

[51] "Chicago Mercantile Exchange Regulatory and Risk Management Systems 1987," p. 1.

[52] "Follow up Report on Financial Oversight of Stock Index Futures Markets during October 1987" by the Commodities Futures Trading Commission, January 6, 1988, p. 8-9.

V. Clearinghouse or Clearing Division

The CME's clearing division, often referred to as a Clearinghouse, maintains responsibility for clearing trades, taking in margin and concluding settlement.

A. Transaction Flow - Trade through Settlement

The CME trades standard contracts by the open "outcry" method in the "pit" established for that commodity. Open outcry involves a trader calling out his bid or offer and another trader accepting it orally. Traders are expected to confirm their trades orally or by hand signal as soon as possible. At least twice during and at the end of a trading session a member must submit his personal written record of the session's transactions to a designated clearing member with whom he deals for clearing.

The Clearing Division or Clearinghouse of the CME matches trades based on the information received from qualified traders as processed by their clearing members. When trades are matched and accepted by the Clearinghouse, the Clearinghouse becomes the contra party to each side of the transaction, both the buyer and the seller.

The Clearinghouse concludes this matching process around 9:00-10:00 p.m. Central time (CT). A "Recap Ledger" is normally provided around 12:00 midnight to 1:00 a.m. CT after each trading day by the Clearinghouse to each clearing member. Margin and settlement requirements are based upon this official summary of trading activity.

Around 3:00 a.m. CT the following day the Clearinghouse contacts their clearing members' four settlement banks advising them of the funds which the clearinghouse should receive and pay out in settlement of variation margin requirements, option premiums and original margin due. By 6:40 a.m. CT, the Clearinghouse expects confirmation from each settlement bank of clearing member payments due the clearinghouse. The Clearinghouse

based on settlement bank confirmation trusts that payments supporting these confirmations will be made later in the day, finally concluding settlement.[53]

B. Potential Exposure between Trading and Settlement-Timing Considerations

The Chicago Mercantile Exchange provides its members with settlement of their trades within 24 hours.

The following schedule details the normal flow commencing with trading of information and funds required to achieve variation margin settlement within the 24 hour period.

Day 1

7:20 a.m. - 3:15 p.m. CT	Trading.
Between 8:00 p.m. and 9:00 p.m. CT	Clearinghouses complete trade matching.
Around 9:00 p.m. CT	Clearing members provide Position Change Sheets to Clearinghouse.
Between 12:00 a.m. and 1:00 a.m. CT	Margin requirements on "Recap Ledger" are made available to clearing members.

Day 2

Around 3:00 a.m.	Clearinghouse provides payment and collection transfer instructions to four Chicago settlement banks.
6:40 a.m. CT	Clearinghouse expects confirmation that payments to their Clearinghouse account from each settlement bank will be made. Bank posting to the settlement account takes place from 6:40 a.m. CT to close of business depending on the settlement bank.
7:20 a.m. CT	Trading begins on the futures exchanges.
7:30-8:00 a.m. CT	Interdistrict Fedwire opens.

[53] The Clearinghouse and settlement banks have developed contractual agreements that address this topic more precisely.

8:30 a.m. CT	S&P 500 Contract opens on the CME.
8:30 a.m. CT (9:30 a.m. ET)	New York Stock Exchange opens.
By 9:30 a.m. CT	Concentration bank will have received and redistributed funds to the settlement banks.
At 1:45 p.m. CT	Clearinghouse identifies prices for intraday margin call.
2:00 p.m. CT	Clearinghouse transmits intra-day banking reports to settlement banks.
By 3:00 p.m. CT	Clearinghouse expects confirmation that payments to the Clearinghouse account at the settlement banks will be made.

The settlement of variation and original margin calls presently depends upon the Clearinghouse's ability to consolidate and distribute trade data swiftly to clearing members and the banking industry's ability to make quick credit decisions, decisions which might be contingent on the transfer of funds. A delay in these events can cause severe difficulties for the Clearinghouse resulting in either a settlement bank or the Clearinghouse being exposed to a defaulting clearing member's non payment of variation margin.

C. Clearing Responsibilities

1. Matching

The Clearinghouse matches trades based on information required from "qualified" traders which is processed and provided by their clearing member. The clearing member sends trade data to the CME via computer to computer transmission any time beginning at 9:00 a.m. CT. The CME also provides a keypunch service for firms with few transactions. (Their keypunch machines are also made available to firms experiencing equipment failure.)

The trade matching process begins with a "Batch Edit Program" in which submitted trade data is checked for validity and completeness. Acceptable data[54] then enters the matching sequence or reconciliation process in which buyer and seller's information must match exactly. Trades that are matched are stored for further processing. Discrepancies in trade matching become "out-trades." The Clearinghouse provides its members with "Unmatched Trade Notices" after each "reconciliation" which identify (1) trades submitted by the clearing member for which no matching confirmation can be found and, (2) all unmatched trades for which that clearing member was listed as the "opposite firm" by another clearing member. (See Chart of Submission Deadlines for "Reconciliation" and Delivery Times for "Unmatched Trade Notices.")

Clearing Member Submission Deadlines for "Reconciliation" and Delivery Times for "Unmatched Trade Notices."

Day 1

7:20 a.m. CT-3:15 p.m. CT	Trading
7:30 a.m. CT	Inter-Exchange Confirmation Matching and Resubmits.
	a) Inter-Exchange Trades are matched. These are usually confirmations submitted by CME firms for trades executed on SIMEX.[55]
	b) Inter Exchange "as of's" are resubmitted by CME firms (for trades executed on the CME that have matched locally) and are matched with confirmation trades submitted by SIMEX to the CME Clearinghouse.
9:00 a.m. CT	Inter-Exchange Unmatched Trade Notices
11:30 a.m. CT	"Intra-Day I" Reconciliation and "as of" resubmits

[54] Eight items for futures, ten for options.

[55] See Appendix N - The Special Trading and Settlement Relationships Between the Singapore International Monetary Exchange (SIMEX) and the Chicago Mercantile Exchange (CME).

12:45 p.m. CT	Unmatched Trade Notices
1:45 p.m. CT	"Intra-Day II" Reconciliation
2:45 p.m. CT	Unmatched Trade Notices
3:30 p.m. CT	"First" Reconciliation
	a) Non S&P Futures & Options - Agricultural - Interest Rates - Currencies
	b) Certain Inter-Exchange Transfers
4:45 p.m. CT	Unmatched Trade Notices
4:45 p.m. CT	"S&P" Reconciliation - All S&P Futures and Options
@5:30 p.m. CT	Unmatched Trade Notices
8:30-8:45 p.m. or	"Final" Reconciliation"
2 hours and 15 minutes after S&P outrade distribution	a) Resubmission of "First" Reconciliation Unmatched Trades
	b) Inter-Exchange confirmations and "as of" resubmits[56]
	c) Final reconciliation of local CME trades
11:30 p.m. CT	Inter-Exchange Matching (SIMEX to CME)
Day 2	
7:30 a.m. CT	Inter-Exchange Confirmations and Resubmits of both confirmations and executed trades not matched during the P.M. cycle if the trade has matched locally.

[56] Trade executed for Inter-Exchange transfer from a previous date that has not cleared for Inter-Exchange match, but has cleared locally.

11:30 a.m. CT Intra-Day Reconciliation

- Resubmission of trades unmatched after a second reconciliation

2. Position Information

Position Change Sheets are the basis for the Clearinghouse's determination of a clearing member's margin requirement. Position Change Sheets function as a daily status report of open and spread positions. An open position for a clearing member reflects open contracts or open interest in the variety of contracts traded and cleared by the clearing member. Open interest is the "total number of contracts in any particular contract, commodity or market that have not been liquidated by an off-setting trade or fulfilled by delivery." The offset of a trade which reduces open interest and thus open positions, reduces the amount of margin a clearing member must pay. Thus, the reporting of open positions is also a means of reflecting offset positions and the reduction of the margin amount required by the CME.

Inter-Exchange transfers, futures' deliveries, options' exercises and assignments, and "as of" transfers contribute to the change in a clearing member's position. Inter-Exchange (Mutual Offset System - SIMEX) transactions are reflected on Position Change Sheets based on the purpose for the trade. If a trade was executed for a SIMEX member and cleared on the CME locally and in the Inter-Exchange clearing there is no change to the clearing member's position. However, if the CME member originated the trade he must determine whether the contract executed was a new or liquidating contract and reflect the Inter Exchange confirmation as such on the Position Change Sheet.

Futures positions that result from the exercise or assignment of an option, as well as futures positions "adjusted by deliveries" are reflected on the Position Change Sheet the day

after exercise, assignment or delivery. "As of" transactions are included on the Position Change Sheet the day they occur.

Management and reporting of spread positions differs from open positions. Spreads result from the simultaneous "buying and selling within the same marketplace or between different futures months of similar securities."[57] Any recognized spread will be allowed spread margins at the Clearinghouse. Spread margins must be specifically requested and both legs must be in the same account. Reporting of spread positions either on the Position Change Sheet or on a Margin Credit Form enables the clearing member to reduce its margin requirements.

a) Futures Spreads

Margin credit for futures' spreads is made available only when there is an equal number of long and short contracts for the same customer or same account owner. These spreads are reported on the Position Change Sheet. An intra-commodity spread (different months, same commodity) are reported under the heading of "Intra-Straddles" while inter-commodity spreads (different commodities) are placed under "Inter-Straddles." Inter-commodity spreads must be approved by the Exchange prior to receiving margin credit. "The margin rate on mixed spreads is generally the higher non-spread speculative margin of the two commodities involved."

b) Option - Option Spreads

The CME finds the following acceptable Option/Option spreads if they are held on behalf of the same account holder:

1) Long Call - Short Call

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[57] Inside the Financial Futures Market, by Mark Powers and David Vogel, Second Edition, 1984, p. 239.

2) Long Put - Short Put

3) Long Call - Long Put

4) Short Call - Short Put

In options, long positions can be spread against longs, and short positions against shorts if these positions "represent futures positions on opposite sides of the market," regardless of contract month or exercise price. However, the equivalent long futures position must "equal the sum of the short futures equivalent". The option/option spread is reported under "Intra Straddles" on the Position Change Sheet.

c) Option - Futures Spread

The four combinations that the CME finds acceptable are:

1. Long Futures - Short Call
2. Short Futures - Long Call
3. Long Future - Long Put
4. Short Future - Short Put

Customers may combine any contract with any exercise price and are required only to report the "option leg of the spread" under "Inter-Straddles" on the Position Change Sheet. The CME employs a Margin Credit Form that provides clearing members with a means of reducing margin on PCS reported multiple option/single future positions. Margin Credit is available for "Inter-Exchange spreads, hedge credit for CME-approved contracts or credit for exceptional inter-commodity spreads."[58]

Floor traders and clearing members may calculate their margin for option/future spreads on a delta based ratio system. "The margin credit given for option/future ratio spreads

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[58] A position on Simex may not be spread against a position on the CME for inter-exchange spread credit.

reflects the difference between the margin charged for naked positions and the spread the margin rate. Both the future and option position are margined initially as naked positions on the Recap Ledger." Full calculations detailing the margin credit request must be submitted with the Margin Credit Form. Margin credit enters the "Recap Ledger" as a "Margin Adjustment" under the futures section. "Margin credit given is equal to the entire futures margin and sum of the [delta] risk margins on the options."

The CME has recently received approval of a new margining system, called Dollars at Risk (DAR) from the CFTC. This system will significantly change the manner in which option-option spreads, and option-future spreads will be margined at the Clearinghouse.[58] The DRA system was implemented on December 16, 1988; the system was renamed Standard Portfolio Analysis of Risk (SPAN) as of April, 1989.

The Mechanics of the Position Change Sheet

Position Change Sheets are computer prepared forms, two of which are provided by the Clearinghouse to the clearing member daily. The clearing member may submit position change data to the Clearinghouse via floppy diskette, magnetic tape or computer to computer link. Separate position sheets are submitted for house accounts and for customer accounts, and within each of these categories a further separation is made between futures and options. The deadline for submission of Position Change Sheets is 9:00 p.m. CT. The Clearinghouse places great weight on proper reporting of trades on Position Change Sheets since they function as the basis for determining margin requirements. As a result, any clearing member not

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[58] A copy of the CME's description of the recently implemented SPAN system is attached as Appendix O. This system replaces the present calculation of an option risk factor using the delta concept described beginning on page 89.

submitting a Position Change Sheet is fined and all trades executed that day are considered new positions requiring full margin payment on a gross basis.

Adjustments to Position Change Sheets are allowed, however, misstatements are expected to be reported to the Clearinghouse immediately. Corrections to statements must be made by 1:00 p.m. the following day and must indicate whether the house or customer position was affected as well as the reason for the adjustment. Significant "material, misstatement of open interest" may be reviewed by an "appropriate committee".[60] "Position adjustments submitted during the last 5 days of trading in any contract [also] may be subject to a fine." In addition, habitual misreporting of contract origination requiring the internal transfer of trades between house and customer positions may necessitate punitive action against the clearing member, with the clearing member being "charged with negligence or submitting false data to the Exchange."

3. Trade Clearing and Reporting

Trade clearing is the process in which each clearing member's "adjusted incoming positions and matched trades are marked to the current day's settlement prices and the amount of margin the firm is required to deposit with the clearinghouse is computed, based on the [clearing member's] final gross margin balance."[61] Trade clearing commences shortly after 8:45-9:00 p.m. when the "Final Reconciliation" of trades and submission of Position Change Sheets occur. The Clearinghouse provides to each clearing member reports generated during trade clearing for reconciliation of its records to those of the Clearinghouse. Discrepancies must be traced back and resolved; large discrepancies in a position must be brought to the attention

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[60] The "appropriate committee" should be the Clearinghouse Committee.

[61] Margin balances would include a summation of margin received and on deposit, available to meet margin requirements.

of the Clearinghouse manager before market opening. These reports include: a Futures Trade Register, Options Trade Register, Recap Ledger, Trade Summary and Inter-Exchange Trade Summary.

a) Trade Registers

The Futures and the Options Trade Registers detail each matched transaction by trade origin (customer or house) and the amount of settlement variation that the clearing member must pay to or may collect from the Clearinghouse for that day. Included at the end of each Trade Register are "Out Trade Settlement Values," a listing of all trades not cleared in the final reconciliation with their respective "settlement and premium values calculated as they would have been had the trades cleared."

b) Trade Summaries

Trade summaries are produced individually for futures, options and inter-exchange trades listing the day's cleared trades in summary fashion by origin and displayed by trade date.

c) Recap Ledger

The Clearinghouse provides to each clearing member a Recap Ledger (by origin) which combines information from the Position Change Sheet with matched trade data. "The Recap Ledger itemizes the incoming gross positions, position changes and resulting new positions, net settlement (pay or collect total from the Futures and Options Trade Registers), and the required margins for each contract. The report summarizes option premium, settlement variation, margin required and spread margin credits both by origin and by division within origin. In addition, the report displays margin on deposit, i.e., cash, Treasury securities (with appropriate haircuts) and letters of credit, and compares these deposits with the new margin requirements. If the new requirements exceed the margin deposits, a cash margin call will be

shown; if deposits exceed the new requirements, a cash release and/or excess Treasury securities and/or letter of credit excess will be displayed."

4. Counterparty and Trade Guarantee

The Clearinghouse, when it accepts a trade, inserts itself as the counterparty becoming the buyer to every seller and the seller to every buyer. As a result the Clearinghouse in its role as counterparty takes on the rights and is "subject to all the liabilities with respect to such transaction(s) of the clearing members who were the original parties to such transaction", thus guaranteeing the fulfillment of accepted trades.

Acceptance of trades requires "a comparison of clearing memoranda [which] must indicate that the Clearing House is long to certain of its members and short to others the identical amount of the same commodity for the same delivery and at corresponding prices." It is unclear from the Rules of the CME and "The Clearinghouse Manual of Operations" what a clearing memoranda is and when acceptance actually occurs. From a practical standpoint the clearinghouse views acceptance of a trade occurring when the trade matches. Confirmation of the guarantee extension to the clearing member occurs with the delivery of the Recap Ledger by the clearinghouse.[82]

Summary Timetable-Clearinghouse Deadlines for Clearing Members: Trading, Reconciliation, Clearing and Reporting

Day 1

7:20 a.m.-3:15 p.m. CT	Trading
7:30 a.m.	Trade Matching
9:00 a.m.	Unmatched Trade Notices

[82] Telephone conversation with John W. McPartland, Vice President, Business Development of the CME Clearinghouse, November 8, 1988. Conversation with John Davidson, Senior Vice President of the CME Clearinghouse, November 10, 1988.

11:30 a.m.	Trade Matching
12:45 p.m.	Unmatched Trade Notices
1:45 p.m.	Trade Matching
2:45 p.m.	Unmatched Trade Notices
3:45 p.m.	Trade Matching
4:45 p.m.	Unmatched Trade Notices
4:45 p.m.	Trade Matching
5:30 p.m.	Unmatched Trade Notices
8:30-8:45 p.m.	Final Reconciliation Unmatched Trade Notices
9:00 p.m.	Position Change Sheet Submission Deadline
After 9:00 p.m.	Trade Clearing

Day 2

3:00 a.m.	Clearing Reports are usually available
1:00 p.m.	Submission of adjustments to Position Change Sheets

The CME plans to offer non U.S.dollar margined contracts and plans to provide through Globex the ability to trade electronically outside of regular exchange hours, new deadlines for margin payments will be introduced and the present clearing schedule will become more complex.

D. Clearing Member Responsibilities

1. Clearance of trades for non-clearing members and customers

The clearing member is the most prominent participant, and the focus of the CME rules. Membership on the Exchange is owned by an individual, who provides its clearing member institution access to the trading floor. The clearing member may trade for its own account or on behalf of customers. A non-clearing member of the Exchange may execute contracts on the Exchange through multiple clearing members but may only be "qualified" by

a single clearing member. (The qualifying clearing member has the right to liquidate the non-clearing member's exchange membership.) A clearing member acts as a conduit between the Clearinghouse and floor trading members. Every clearing member must meet financial capitalization requirements and abide by position limits based on the firm's adjusted net capital.

Within the International Monetary Market Division (IMM) of the CME, there exists a second category of clearing member, a Class B clearing member. Just as a non-member must be qualified on the CME, the Class B clearing member in the IMM must obtain a guarantee from the primary clearing member for all of its trades. A class B clearing member may clear only foreign currency futures and must be fully arbitraged between the IMM and the inter-bank FX market.

A clearing member is an intermediary between the Clearinghouse and traders who represent themselves and public customers. From an operational perspective a clearing member accepts trades from "qualified" traders (for their own accounts) or the accounts of the clearing member's customers. In so doing, a clearing member is obliged to match, clear, deliver, exercise or offset these trades as instructed. Since the clearing member is holding the contract on behalf of these parties, the clearing member becomes responsible for performance under these contracts in the eyes of the Clearinghouse. Thus, the acceptance of basic operational responsibilities entails a significant financial consideration on the part of the clearing member of the parties it represents. Margin is a means of controlling those financial concerns. "The purpose of margin is to help insure performance by the customer and, thus the performance of the clearing member."[83] Margin is one of several means by which the Clearinghouse can ensure performance by the clearing member.

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[83] "Financial Safeguard System of the Chicago Mercantile Exchange," August 1985, Pamphlet produced by the Chicago Mercantile Exchange.

2. Margin

The rules of the Chicago Mercantile Exchange, and its Clearinghouse[64] require security deposits and margin from each clearing member. Similar but separate margin requirements are required by the clearing member from its non-clearing members and all other customers. To help assure performance on all of its obligations to the CME clearinghouse, each clearing member must deposit with the Clearinghouse a security deposit no less than "the greater of $200,000 or $100,000 plus one percent of its average total margin requirement (house and customer) for the preceding calendar quarter subject to a maximum of $2,000,000." This deposit may be in cash or U.S. Treasury Securities.[65]

Futures

In the futures market, there are four types of margin. Each day, clearing members pay (1) original and (2) settlement variation (often called variation margin) to the Clearinghouse. (Settlement variation is now routinely requested intraday. It was formerly referred to as additional or emergency margin.) Non-clearing members or customers pay (3) initial and (4) maintenance (also called additional) margin to clearing members.

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[64] Each futures exchange has its own Clearinghouse responsible for clearing trades, taking in margin and concluding settlement.

[65] A deposit of $100,000 for a class A clearing member and $50,000 for a class B clearing member must be maintained even if no positions are being carried.

It is the CME's policy not to pay interest on any cash security deposits or margin which it holds.

Original margin,[66] similar in concept to a performance bond, is established by the Clearinghouse. It is posted by both parties to a futures contract on the morning of the day following contract establishment and remains in place until the position which it supports has been liquidated by offset, exercises, assignment or delivery. Original margin is held by the Clearinghouse. The Clearinghouse will accept cash, U.S. Treasury bills[67] or letters of credit. Clearing members are in turn required to assess initial margin.

The minimum amount of initial margin which clearing members must collect from non-clearing members[68] or individual customers is determined by the Board of Governors of the Exchange based on the type of transaction-- hedge, speculative or spread.

Initial margin reflects the risk of a one day move in a position plus a cushion of approximately one-third. The maintenance level of margin (about a one day price move) is held by the Clearinghouse as original margin. The buffer is held by the clearing member. Initial margin may be drawn down by the clearing member to cover losses, if a non-clearing member or customer fails to pay settlement variation and positions must be liquidated.

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[66] The CME Clearinghouse and the New York Mercantile Exchange Clearinghouse unlike the other futures' clearinghouses collects original margin on a gross, not on a net basis. In other words, a clearing member may not net a long position of one of its non-clearing members against a short position of another non-clearing member; it must pay the gross amount due for each account on its books as original margins, even if one account has a position opposite that of another.

[67] Treasury securities may be used for original margin above $25,000. Whenever a clearing member's aggregate cash and U.S. Treasury securities margin deposit exceeds $50,000, a clearing member with $500,000 liquid capital on the International Monetary Market or Index and Option Market may employ a "Margin Letter of Credit" from a bank acceptable to the Exchange to satisfy margin requirements.

[68] A non-clearing member is an individual member of the CME and may act as a floor broker (i.e. filling orders in the pit for clearing members) or as a floor trader (i.e. trading for his or her own account), or both. Floor brokers and floor traders submit executed trade information directly to the clearing member (the "qualifying" clearing member in the case of a floor trader) for processing and submission to the clearinghouse.

Clearing members may accept cash, U.S. Treasury obligations, securities listed on the New York or American Stock Exchange and gold warehouse receipts[80] registered for delivery on a U.S. market or letters of credit for International Monetary Market or Index and Option Market traded commodities. Payment of initial margin occurs on a schedule established by the clearing member, based upon its evaluation of each of its respective non-clearing members or customers. The CFTC provides a clearing member with an incentive to obtain this margin in a timely manner by requiring that it take a capital charge on the third business day after which a call remains unfunded. Gross margining can provide Clearing Members with a further incentive since a substantial portion of non clearing or customer margin for each position must be passed on to the Clearinghouse.

Settlement variation, or variation margin payment is the Clearing Member's margin requirement that in effect marks its positions to market. Only cash is acceptable as payment for settlement variation. It is calculated at least twice per trading session; once at 1:45 p.m. CT as part of the routine intra-day settlement and committed to by the settlement banks no later than 3:00 p.m. CT, and once at the end of the trading session with settlement bank commitments required before the opening of business the next day. This settlement variation reflects the difference between the price from the previous mark-to-market, whether it be as result of an intra-day settlement or the end-of-session settlement, and the current mark-to-market price. Here "margins are not fixed as a percentage of total contract value" but rather are based on actual market movements. Losses due to price movements "are calculated and passed through" in cash to those market participants having participated in the favorable market move (i.e. the "zero sum" feature of futures markets). Cash is redistributed at the direction of

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[80] Equities are accepted at no more than 70 percent of market value. Warehouse receipts may be accepted at no more than 50 percent of market value.

the Clearing House, by the settlement banks, among all Clearing Members, and occurs after the opening of the markets the following day in the case of the end-of-session mark-to-market, and prior to close of business via Fedwire in the case of the intra-day settlement.

At the conclusion of a clearing, clearing members pay to or receive from the Clearinghouse a net figure (incorporating both original and variation margin) reflecting the business that was posted for that day. Net debit balances must be paid to a bank designated by the Clearinghouse no later than "10 minutes prior to the first contract opening for trading" the following day. A credit will be "released by the Clearinghouse the following day." (Unlike incoming balances, there is no explicit time specified for credit payments.)

On March 1, 1988 the CME instituted a regular intraday futures variation margin call made at 2:00 p.m. to clearing members whose positions (house or customer) from the day prior show a loss of $1,000,000 or more. At 2:00 p.m. the Clearinghouse also sends a facsimile copy of transfer instructions to the settlement banks. This regular intraday call must be met with bank commitments by 3:00 p.m. and cash payment shortly thereafter. If a clearing member has a gain of $1,000,000 or more in its positions it may contact the CME by 2:30 p.m. and request payment of 90 percent of the amount. "The CME will not pay-out more than the firm's margin on deposit with the Clearinghouse." Plans for incorporation of present day transactions in this regular intraday call are scheduled for later in 1989.

In addition to regular intra-day settlement variation, emergency or an advance call for settlement may also be required from clearing members by the President of the Exchange to "maintain an orderly market or to preserve fiscal integrity." This type of emergency action functions as an additional intra-day settlement variation call for clearing members with substantial debit positions. These emergency or additional calls must be met "during the next

banking hour" or at some other specified time. Certified or cashier's check, wire transfer, letter of credit and U.S. Treasury securities are acceptable for these special intra-day calls.

Additional margin may also be required of a clearing member if the Chairman of the Board, President and Chairman of the Clearinghouse Committee determine that the clearing member's commitments in his own and his customer accounts are too large based on the clearing member's financial condition. An additional margin call of this type must be met within the hour or the clearing member will have to transfer a certain number of open positions to another clearing member.

If a clearing member fails to deposit and maintain additional margin or comply with the directive to transfer positions, the Chairman of the Clearinghouse Committee will require the clearing member to close out all or part of its trades. If this does not occur by the next business day, the President will close out whatever portion of the clearing member's position that is necessary "to correct the delinquency."

Calls for additional customer margin are at the discretion of the clearing member except when the customer's initial margin level drops below the minimum requirement. (Non-clearing members or customers must maintain their accounts at a level no less than the maintenance margin.) The clearing member must then call for additional margin. If this call is not met within one hour, the clearing member is authorized to decide whether or not to close out trades which would restore the account to the required level. Clearing members may carry these undermargined positions as accounts receivable and decide "after the margin call has been outstanding for three business days"[70] whether to extend a loan and charge interest or liquidate the position.

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[70] "Follow-up Report on Financial Oversight of Stock Index Futures Markets during October 1987," by the Commodities Futures Trading Commission, January 6, 1988, p. 22.

"Clearing members [are] responsible to the Exchange for all margin requirements" including the policing of margin from its customers and non-clearing members for whom it settles. If a clearing member fails to maintain customer margin, the President of the Exchange may require that the clearing member close out positions of its own to make up the deficiency.

Options

The Chicago Mercantile Exchange approaches the margining of options in a different manner than that of futures. Clearing members and individual members use a "delta" (now portfolio) based margin system while public customers, as a result of CFTC requirements, use a "strategy" based margin system.

Clearing members may claim spread margin credits on (1) inter-commodity spreads, (2) intra-commodity spreads, where acceptable pairing of contracts and margining on the combination is allowed by the Clearinghouse and (3) on the remaining uncovered long or short positions (naked options). Each of these three kinds of clearing member margin is calculated differently while basically incorporating delta (now portfolio) based margin concepts. Variation margin and margin, categories employed for futures contracts, are overlaid on the delta (now portfolio) based approach and are described below.

Settlement variation and margin payments "exist" for options but are structured differently than for futures. Clearing member variation margin involves the payment of option premium on the day the contract is opened.

Clearing member margin calculated daily includes two elements involving equity (or premium) and risk (or delta value). The equity element reflects:

a. Margin credit on a long position equal to the premium marked-to-market daily.

b. Margin debit on a short position equal to the premium marked-to-market which is "assessed" on a daily basis.

In concept the equity element of margin is very similar to futures variation margin (incorporating the marking-to-market function) but is not called that, nor is it aggregated under that heading for reporting purposes. For the buyer, it represents an increase in net asset value which is available only for use as additional original margin.

The risk factor[71] involves two components: (a) the delta concept (the ratio of an option's price change to the underlying future's price change) and (b) the futures hedge margin (representing a one day price move for the futures contract). The futures margin is multiplied by the delta ratio to produce the risk factor which reflects the expectation of the option's one day price move.

Finally, the clearing member calculates its margin due the Clearinghouse for: (a) short options positions by adding the risk factor to equity (marked-to-market premium) or (b) for long options by reducing collateral value of the marked-to-market premium by the risk factor.

A clearing member that has a short uncovered options position in a commodity will have its account debited for margin composed of the marked-to-market portion of the premium plus the Risk Factor [Delta multiplied by the CME's "designated dollar amount (DDA)."][72] If the margin figure is less than the minimum amount set forth in "Contract Specification" then the margin will be the minimum specified amount.

A clearing member that has a long uncovered position in an option will receive a margin credit which includes the marked-to-market portion of the premium minus the Risk Factor (Delta multiplied by the DDA). If the risk component is greater than the equity component, the margin credit is equal to zero. The margin credit for a long uncovered position

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[71] The SPAN systems replaces the delta with a portfolio calculation of an option risk factor. See Appendix O. The equity calculation for margin remains unchanged.

[72] The "designated dollar amount (DDA)" is most often the equivalent of the underlying futures hedge margin.

is given collateral value by the CME and may be used "whenever good faith margins are required - on other short options positions or other futures positions. It cannot, however, be used for settlement variation on other futures contracts or as premium variation to purchase other long contracts, both of which require cash." If margin credit increases then margin required decreases. If margin credits exceed margin requirements, margin held at the clearinghouse in the form of Treasuries, letters of credit or cash may be released to the clearing member upon request to the Clearinghouse.

Naked or uncovered options for clearing members are reported by origin[73] and contract on the Recap Ledger under "Margin Required."

Under the delta margining system, Clearing Members also pay margin on inter- and intra-commodity spreads. In the option market, a spread is the purchase of a put (call) and sale of a put (call) on the same commodity [intra-commodity], with each option having a different strike price or the purchase (sale) of a put and call with the same or different strike prices. A spread may contain different strike price or expiration date options on the same commodity. Inter-commodity spreads refer to an option which is spread against a futures contract in the same commodity.

In an intra commodity or option/option spread the delta for the long position within a commodity is added to the delta of the short position preceded by a negative sign. The absolute value of the resulting figure multiplied by the CME's designated dollar amount (risk component) minus the combined, marked-to-market premium amounts (equity component) produces the final intra-commodity margin figure. This may be either a margin charge or a credit when long option value exceeds both short option equity and total risk.

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[73] Origin is a category on the Trade Confirmation Card used to indicate whether a trade was made for a customer or a clearing member's house account.

Intra-commodity spreads for a clearing member are reported by origin and by contract and unlike naked options are not reported separately on the Recap Ledger under the "Margin Required" Column but are combined to provide a total margin required figure for the contract type which is subsequently added to the "Margin Required" category.

Inter-Commodity spreads or option/future spreads are the final margin amount required by the CME of a clearing member handling options. The calculation for margin on an option/future spread entails the following: The futures contract is assigned a delta of 1.0. The options delta is subtracted from this. The resulting figure becomes the multiplier of the CME's designated dollar amount (usually equal to the futures hedge margin) which is in turn reduced by long option equity or increased by short option equity (the marked-to-market portion of the premium).

Inter spreads are reported on the Recap Ledger in the same manner as Intra-Commodity Spreads.

Floor Traders or member's accounts are also margined using the delta based system, albeit somewhat differently. "The Clearinghouse Manual of Operations" for the CME points out that the clearing member "knows the actual positions of each trader,there is no need to separate naked, inter and intra spreads. That is, the entire account can be margined as a unit [... following the intra spread margin approach described previously]. Delta offsets are only allowed within a commodity except in the case of Treasury Bill - Eurodollar option/option spreads. However, credits resulting from a long premium can be used to offset margin requirements for all commodities."[74]

Public customers pay margin for option contracts they request broker/members to execute on the exchange. Public customers, as described by the Options Manager of the

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[74] See Appendix P for Floor Trader Margin Calculation.

CME-Clearinghouse,[75] use a "Strategy" based margin approach which like the delta based system has three kinds of position margined: (1) uncovered, (2) option/option spread or (3) option/future spread. The Strategy based approach, instead of evaluating the option/future relationship using the delta ratio, relies on the marking to market of the options premium, the actual margin on the futures contract, minimum customer margin tables and clearinghouse recognized contract relationships based on exercise price, maturity date, and degree of movement.

Margin set by the exchange for public customers is the minimum, brokers may charge higher amounts.[76]

3. Custodial Banks

Margin is held by and settled through four Chicago banks.[77] Custody of Treasury securities as margin is the focus of this section, cash settlement will be addressed in the following section.

The Clearinghouse has two safekeeping accounts at each of the four settlement banks sub-accounted by Clearing member; one clearing member non-segregated (house) account and one customer segregated account. Treasuries from a cash management standpoint are a more efficient means of meeting margin requirements (which allow for non-cash substitute) since the CME does not pay interest on excess cash deposits held in margin accounts.

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[75] Telephone conversation with Kate Myer, Options Manager of the CME Clearinghouse, May 11, 1988.

[76] See Appendix Q for Margin Requirements by Contract for Public Customer.

[77] Custodial banks for the CME are: Continental Bank; The First National Bank of Chicago; The Harris Trust and Savings Bank; and The Northern Trust Company.

Treasury securities are valued at "the bid price for the security as published in the current day's Wall Street Journal." Treasury bills are rounded down to the nearest $1,000. All Treasury notes and bonds receive a haircut of 5 percent. "An additional 5 percent haircut is applied if the note or bond was issued more than 9 months ago and still an additional 5 percent haircut if the note or bond has a time to maturity or an earliest call date of more than 5 years." Treasuries accepted as margin are marked-to-market once and not revalued, thus the reason for the steep haircuts on Treasury notes and bonds.

The CME has established certain parameters within which cash may be removed and replaced with Treasuries and how Treasuries achieve same day or next day value. They are as follows:

a) Same Day Credit of Treasuries

Treasuries may be exchanged for cash employed in the settlement of the prior day's margin if the Treasuries are sent to the settlement bank by 9:00 a.m. and are confirmed by the bank to the CME by 10:00 a.m. Cash will be released to the clearing member at 11:00 a.m.

b) Same Day Value - Satisfaction of Current Day Margin Requirements.

The CME, based on a settlement bank's telephone advisement prior to 10:00 a.m. of the forthcoming delivery of Treasuries, files standing instructions with the Settlement Banks to release cash margin. The securities must be received by 3:30 p.m. the same day, otherwise, "cash cannot be released." Treasuries received by 3:00 p.m. may be used to satisfy margin requirements reflecting the current day's trading.

c) Next Day Value - Satisfaction of Next Day Margin Requirement

"Firms depositing Treasuries into the CME safekeeping account after 3:30 p.m. will receive margin credit in satisfaction of the following business day's margin requirements. Excess cash on deposit, up to the market value of Treasuries deposited, is released to clearing firms at 7:00 a.m. on the banking day following receipt of the Treasuries.

E. Settlement

1. Participants and the Banking Industry

The Clearinghouse maintains a settlement variation account with sub accounts for clearing members at each settlement bank.[78] Separate from this Clearinghouse account, each clearing member must maintain two accounts[79] of its own for the payment and collection of settlement variation and original margin at one of the settlement banks. "Each clearing member is required to sign documents giving its bank permission to debit these accounts acting solely on the instructions of the Clearinghouse."[80]

With the establishment of these accounts for the Clearinghouse and each clearing member, the settlement banks are able to confirm and internally transfer margin payments to and from the Clearinghouse settlement variation account.

However, the Clearinghouse must be able to move funds from one settlement bank to another in order to zero out variation accounts. In practice, net payments are made from the settlement variation accounts at three settlement banks to the Clearinghouse variation

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[78] The four Chicago settlement banks are: Continental Bank; The First National Bank of Chicago; The Harris Trust and Savings Bank; and The Northern Trust Company

[79] Clearing members maintain:
1. Proprietary account - clearing members house account; and
2. Non proprietary - segregated customer account.

[80] "Report of the Presidential Task Force on Market Mechanism," January 1988, p. VI-24.

account at the concentration bank.[81] The concentration bank redistributes the funds to the settlement banks for payment to the net recipients.

"Clearing members generally post debits and credits overnight... Generally cash does not move from clearing member to customer until after the Clearinghouse settlement system results in payments to the clearing members."[82] This means that customers normally will not be paid until after 9:30 a.m. CT.

2. "Trust Me" system

The CME clearinghouse functions under several basic assumptions about variation settlement:

1) The Exchanges normally expect settlement banks to confirm their transfer instructions at 6:40 a.m. CT, regardless of delays in trade matching and position advisement of clearing members. Settlement banks do not have the means to receive funds from any banks at that hour and must rely on promises of payment by other banks.

2) Settlement bank confirmation is expected before the CME opens. This enables the CME to be in compliance with its own rules and to limit the amount of exposure under "their guarantee obligations to the amount of a single day's price move."

The settlement banks, however, have executed agreements that provide them with full latitude in their decisions regarding confirmation. "Neither the agreements between the clearing organization and the settlement banks nor the agreements between the settlement banks and the clearing firms appear to contemplate the situation in which a settlement bank confirms that it will honor a pay or collect in the absence of sufficient funds in the clearing firm

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[81] Harris Trust and Savings Bank functions both as a settlement and as the concentration bank.

[82] "Report of The Presidential Task Force on Market Mechanisms," January 1988, p. VI-25.

sub-account or clearing organization variation account, respectively, to cover the obligation."[83] The present confirmation and settlement system works because the players trust each other. The CFTC would like to see these agreements clarified so that a bank's commitment to honor their clearing firm variation obligations are "final and irrevocable." The CME, Board of Trade Clearing Corporation and the four settlement banks have recently concluded the negotiation and execution of a common settlement agreement addressing this issue.

3. Sufficient Funds, Credit Considerations

How does a settlement bank come to a decision to confirm a Clearinghouse instruction for settlement? Here the transfer systems are normally reliant on credit judgments. If funds are not received from clearing firms, a daylight overdraft could become an overnight loan. The funds needed in these settlement banks are usually at other financial institutions (funding banks) which also have to determine if their customer has sufficient funds or if the customer is creditworthy. In a crisis situation the flow of funds upward could be delayed, based on credit evaluations demanded in a short time period, especially at very early morning hours when lending officers are often unavailable.[84] If the credit decision were negative it would also entail further delays while the futures organization arranged for funding from an alternative source. A little over a year ago, the CME commenced routine intra day margin calls which have reduced the magnitude of settlement variation payments that are due early the following

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[83] "Follow-up Report on Financial Oversight of Stock Index FUtures Markets during October 1987," by the Commodities Futures Trading Commission, January 6, 1988, p. 53.

[84] The difficulties of contingency planning are obvious when no one is sure of funding requirements until late at night or early the following morning when trade processing is completed. As described by the Brady Commission, this decision-making process becomes more complicated when more than one market is involved and losses in one market are offset by gains in another.

In March 1988, the CME introduced a routine intra-day margin call which should reduce the normal magnitude of settlement variation due prior to Exchange opening.

morning.

4. Use of Payment Systems

To achieve timely variation margin settlement the CME needs to establish and disseminate variation margin requirements to settlement banks and to clearing members who in turn must contact their funding banks as soon as possible. Currently, the futures exchanges employ the "outcry" method of trading which generates a clearing process that begins during the trading morning and concludes with a final matching late in the evening. Settlement banks will receive payment and collection transfer instruction around 3:00 a.m. CT from the clearinghouse.

The later a clearing member and its funding bank know what is required, the more difficult it is for the funding bank to make appropriate credit and payment decisions.[85] In addition, information regarding a clearing member's activity on the futures exchanges may need to be evaluated in conjunction with the clearing member's activities in other markets and exchanges (both equities and options).

The banking industry's ability to view its customers' credit request thus depends on obtaining information from all relevant markets and sources,[86] not just futures margin calls.

Fedwire is a conduit. Funds flow across it when the banking industry determines that their customers are creditworthy and their requests reasonable.[87]

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[85] Some clearing members have developed risk management programs to assist them in the estimation of intra-day calls for settlement variation.

[86] Sources may include current information on deposit balances and securities in safekeeping, as well as, an understanding of the business practices and settlement pattern of the individual clearing member requiring credit.

[87] In extraordinary circumstances such as when the Federal Reserve finds a depository institution's financial condition unsatisfactory, the Federal Reserve may stop payments in order to protect itself.

The settlement system procedures employed by the futures market places the banking industry in a difficult credit situation at the best of times and an impossible one at the worst of times. The requirement for settlement banks to confirm, by 6:40 a.m. CT, that variation margin will be paid forces settlement banks to trust funding bank's promises to pay. Fedwire is unavailable on an interdistrict basis at that hour, so payments cannot flow.[88] More importantly the funding bank's credit decision makers normally are not available then and in extraordinary situations may very well be unwilling to fund immediately.

The futures exchanges would argue that a change in Fedwire operating hours would improve this situation by allowing the clearinghouse to layoff risk with the banking industry sooner, as well as, respond to perceived changes in global market forces.

5. Replacement of the Clearinghouse Guarantee

"The clearing organization [Clearinghouse] is the guarantor of each contract that it clears. Consequently, if the clearing firm carrying a futures [or options] position were to fail to satisfy its obligations under that contract, the clearing organization must do so."[89] The settlement bank, when it confirms payment and agrees to take on credit responsibility for a clearing firm's overdraft, "severs" the Clearinghouse guarantee. The Clearinghouse from its perspective relies on the substitution of settlement bank credit for that of its clearing members to ensure that another day's price risk has been removed. If the clearing firm does not pay the funds required, the Clearinghouse is no longer obligated to employ its liquidation process (see next section). Instead, the settlement bank is responsible and must take action independently.

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[88] Even though Fedwire opened early on October 22, 1987 at the request of the Futures Exchanges there was an absence of traffic on the system.

[89] "Follow-up Report on Financial Oversight of Stock Index Futures Market during October 1987," by the Commodities Futures Trading Commission, January 6, 1988, p. 16. (See also Chapter 8, Section 804 of the "CME Consolidated Rules" for further amplification.)

Access to collateral would appear to be a matter of contract between the clearing member and the bank.

6. Settlement Default

Settlement risk associated with margin calls is addressed by the Clearinghouse guarantee of trade performance. If a clearing member fails to settle,[90] the Clearinghouse is entitled to use the clearing member's security deposit, margins on deposit with the Clearinghouse and any other assets available to the Exchange. If this is still insufficient to cover the loss, the Clearinghouse will use the following sources in priority order:

1. Surplus funds of the Exchange.
2. Security deposits of other clearing members on a pro rata basis.
3. Assessment against clearing members based on adjusted net capital on a pro rata basis.
4. Proportional assessment based in part on contracts cleared and in part or total open commitments.

After this loss allocation is made, each clearing member's security deposits must be restored to the required level. If surplus funds become available, the Clearinghouse will replenish members security deposits. If not, the clearing member is expected to make good the deficient amount.

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[90] "If a default occurs in the clearing member's customer account [which cause the clearing member to default] the Clearinghouse has the right to apply all customer margin deposits for that account toward the default. Accordingly, the margins deposited by customers not causing the default are potentially at risk if there is a default in the customer account of their clearing member." From "The Financial Safeguard System of the Chicago Mercantile Exchange" by The Chicago Mercantile Exchange, March 1988, p. 6.

7. Clearing Member Responsibilities to Non-Clearing Members

Clearing members pay non-clearing members settlement variation only upon receipt from the Clearinghouse.[91] Clearing members neither guarantee settlement by the Clearinghouse nor extend the Clearinghouse's trade guarantee to the non-clearing member. The relationship between the clearing member and the non-clearing member is governed by an agreement which is reasonably standard throughout the industry.[92] A customer or non-clearing member's recourse to the clearing member is limited to the specifics of the account agreement and any remedies afforded by the rules of the CME, the CFTC or the National Futures Association. The CFTC, however, does require that fair notice be given to non-clearing members so that their potential exposure is understood. In addition, the Clearinghouse makes available a Trust Fund "for customers who have lost funds as a result of an insolvency of their clearing member."[93]

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[91] This is not an exchange rule, it appears to be an industry convention. Although there is at least one major clearing member who will pay its customers when due even if the clearinghouse has not paid them.

[92] A clearing member is not required by rule or regulation to have legal agreements with non-clearing members or customers. They are, however, required to have risk disclosure statements on file for futures and options clients.

[93] "Chicago Mercantile Exchange Regulatory and Risk Management Systems 1987" p. 13. "The Trust Fund consists of approximately $28 million in assets ... funded out of the Exchange's operations."

APPENDIX A[84]

"MAJOR OFFENSES. - It shall be a major offense:

a. to be interested in, operate or knowingly represent or make any transaction with a bucket-shop;

b. to be guilty of fraud or any act of bad faith;

c. to be guilty of any dishonest conduct;

d. to make or report a false or fictitious trade;

e. to attempt extortion;

f. to buy or sell any commodity intending to make default on such purchase or sale;

g. to act as both buyer and seller in the same transaction;

h. to manipulate prices or attempt to manipulate prices or to corner or attempt to corner the market;

i. to make a material misstatement to the Board or to a committee, or on any information supplied to the Exchange or its officials;

j. to knowingly disseminate false, misleading or inaccurate reports concerning crop or market information or conditions that affect or tend to affect the price of any commodity upon the Exchange;

k. to trade or accept margins after insolvency;

l. to fail to appear before the Board, President or any investigative and hearing committee at a duly convened investigative hearing or in connection with any investigation; to fail to fully answer all questions and produce all books and records at such hearing or investigation, or to testify falsely; to fail to produce any books or records requested by Exchange staff in connection with an investigation within 30 days after such request is made or to fail to appear at a scheduled staff interview, which shall be tape recorded at the request of either the person being interviewed or Exchange staff, unless good cause is shown for such failure;

m. to make improper use of or reveal any confidential information obtained by reason of participating in any Board of Governors or Committee meeting or hearing;

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[84] Consolidated Rules of the Chicago Mercantile Exchange and the International Monetary Market Division and the Index and Option Division by The Chicago Mercantile Exchange, Chapter 4, p. 23.

n. to knowingly accept, directly or indirectly, a trade on the Exchange for the account of a non member employed on the floor of the Exchange.

o. for a member or clearing member to permit the use of its facilities or membership privileges by a member or nonmember in a manner that impairs the dignity or degrades the good name of the Exchange, or creates a market or other situation detrimental to the Exchange, or results in violation of the speculative limit rules, or effectuates manipulations or corners or attempts at either; or to itself do any of the foregoing.

p. for a clearing member to fail to maintain minimum financial requirements;

q. to commit an act which is substantially detrimental to the interest or welfare of the Exchange;

r. to refuse to submit to arbitration any dispute which the President or the Board, on appeal, decides should be arbitrated pursuant to Rule 600; or to refuse to comply with a final arbitration award;

s. to refuse, after hearing, to comply with an order of the Board, the President or any hearing committee;

t. to violate a rule which cites such violation as a major offense;

u. except where a power of attorney or similar document has been executed pursuant to Rule 932, for a member or commodity representative to accept or transmit a customer order which has not been specifically authorized, i.e., the customer has not specified commodity, contract month, quantity, time and price; and

v. to be expelled from a U.S. designated commodities or securities exchange."

w. for a member or member firms to directly or indirectly pay or promise to pay to any employee of another member or member firm, any compensation or gratuity valued in excess of $100 in any year unless such compensation is for service rendered and has been previously approved in writing by the employer.

APPENDIX B[95]

"MINOR OFFENSES. - It shall be a minor offense:

a. to be guilty of dishonorable conduct;

b. to be guilty of uncommercial conduct;

c; to be guilty of any conduct which has a manifest tendency to impair the dignity or the good name of the Exchange;

d. to interpose a Statute of Frauds defense to any claim for breach of an exchange contract;

e. to make a false entry upon a clearing sheet;

f. to violate any rule, the violation of which is not a major offense; and

g. to circulate or aid in the circulation in any manner of rumors which tend to reflect on the integrity of any contract.

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[95] Ibid, Chapter 4, p. 24.

APPENDIX C[86]

Business Conduct Committee-Hearings and Penalties

Hearings and investigations by the Business Conduct Committee on rule infractions where the Exchange member is found guilty may result in:

a) A cease and desist order.

b) An order to liquidate a portion of a member's proprietary or customer open contracts "to insure the integrity of the Exchange contracts or to insure and an orderly and liquid market."

c) An order to the member or his customer to provide additional margin as necessary "to protect the integrity of open contracts."

d) Suspension of a member's floor broker registration and/or floor trading privileges for a period not to exceed one year.

e) Imposition of no more than a $100,000 fine or less in addition to "the monetary value of any benefit received as a result of the violative action."

f) Position limitations.

g) Advertising restrictions.

If this committee (or any other standing committee as a result of its hearings) deems that a greater penalty is warranted which exceeds its authority, it may refer the matter to the Board of Governors for "further hearings and a decision."

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[86] Ibid, Chapter 4.

APPENDIX D[97]

Emergency Conditions and Actions

The Business Conduct Committee has been empowered by the Board to act if it determines by hearing or investigation "the existence of an emergency which threatens the integrity, liquidity or orderly liquidation of any contract." The following outlines emergency circumstances:

a) The threat or occurrence of manipulation, cornering or a squeeze.

b) A threat to contract liquidity through position concentration with individuals who are unable or unwilling to make or take delivery.

c) "An action of the United States or any foreign government or any other contract market, board of trade or trade association [that] is likely to have a direct and adverse impact on the integrity, liquidity and orderly liquidation of any contract."

d) An "unusual, unforeseeable and adverse" occurrence where it is not practicable to contact the Commodity Futures Trading Commission for prior approval of a rule.

The Business Conduct Committee may take any of the following actions to remedy the emergency situation:

a) Trading termination

b) Trading limitation to liquidation of contracts only

c) Account or position liquidation

d) Confinement of trading to a particular price range

e) Modification of trading hours and days

f) Alteration of delivery conditions

g) Fixing the settlement price at which contracts are liquidated

h) Requiring the deposit of additional margin with the clearinghouse

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[97] Ibid, Chapter 4.

However, a two thirds vote of the committee members present must be achieved to take these actions. A member or clearing member affected by these emergency actions may appeal to the Board of Governors.

The Business Conduct Committee must promptly notify both the Board and the Commodity Futures Trading Commission (CFTC) of its actions. These emergency actions may not remain in effect beyond 30 days of their imposition without express CFTC authorization and "in no event shall action taken pursuant to this rule remain in effect for more than 90 days following its imposition."

APPENDIX E[96]

Non Member Trading Violations

The Business Conduct Committee, after preliminary investigation by the President, Department of Compliance and Audits, Probable Cause Committee or itself, may believe a non-member to be trading in violation of the Commodities Exchange Act or other law, rule or regulation. The Business Conduct Committee may then request the non-member and member that clears his trades to appear, provide information or testify at a hearing. If the non-member's actions threaten to cause an emergency as described above, the Committee may:

a) "order any clearing member to liquidate all or any portion of such non-member's position in the threatened contract

b) order that no member accept new positions in the threatened contract on behalf of any such non-member

c) order such action as is necessary to prevent the threat to the contract."

[96] Ibid, Chapter 4.

APPENDIX F[99]

Speculative Position Limit Rules and Penalties

The Business Conduct Committee is charged with the enforcement of speculative position limit rules.[100] The first violation of speculative position limits usually results in a warning letter, the second occurrence in cease and desist order. Both occurrences require a reduction in position and imposition of fines against a member, clearing member or commodity representative (if it involves a customer account) depending upon the account involved. A third violation by a customer trading through more than one clearing member. "will result in a hearing to deny access to the market." The Business Conduct committee may also impose other penalties.

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[99] Ibid, Chapter 4.

[100] "For purposes of this rule, positions in excess of any allowed by a valid hedge approval shall be deemed speculative position limit violations."

APPENDIX G[101]

Clearinghouse Committee Hearings and Penalties

Hearings by the Clearinghouse Committee are orchestrated by the Chairman who chooses at least three members by lot from the main committee who have not participated in a hearing or have participated infrequently to constitute the hearing subcommittee. This hearing subcommittee's decision must be by majority vote and is considered the action of the full committee. If a member is found guilty, after his hearing, or if found to be in a financial condition that may jeopardize the exchange, the subcommittee may:

a) Issue a cease and desist order to the member regarding its conduct found to be in violation.

b) Order the deposit of additional margin by the member or his customer.

c) Prescribe additional capital requirements.

d) Limit positions.

e) Fine the member not more than $50,000 or less in addition to requiring payment of the "monetary value of any benefit received as a result of the violative action."

f) Suspend the clearing member subject to approval by any two of the following: President, Chairman of the Board or of the Clearinghouse Committee. "The member's facilities and open trades shall remain suspended for liquidation only, until the matter is finally determined by the Board."

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[101] Ibid, Chapter 4.

APPENDIX H[102]

Clearinghouse Committee Emergency Actions

The Committee may take any of the following appropriate actions in an emergency:

a) Order the deposit of additional margin by the member or his customer.

b) Prescribe additional capital requirements.

c) Limit positions.

d) Order member or clearinghouse members to deposit special or advance margins for longs, shorts or both.

e) Order appropriate margin changes.

Clearinghouse Committee voting and notification requirements are similar to those described for the Business Conduct Committee.

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[102] Ibid, Chapter 4.

APPENDIX I[103]

Customer Arbitration Proceedings and Actions

Once a customer has decided upon arbitration, he has the choice of being heard before a panel consisting entirely of members of the CR/CCC or a mixed panel "designated by the President consisting of two members or alternate members from the CR/CCC and three persons who are not members or employees or associated with any member of the Exchange." The arbitration hearing must occur within 30 days of the date the committee is notified or the mixed panel is chosen. Both claimant and counter-claimant may personally appear and be represented by legal counsel. The panel or committee must decide by majority vote if the member or commodity representative is guilty of the offense. If found in violation the committee may:

a) Issue a cease and desist order.

b) Place the member or customer representative on probation.

c) Impose a fine of $50,000 or less in addition to "the monetary value of any benefit received as a result of the violative action."

d) Suspend a member for six months or less.

e) Suspend or terminate a commodity representative's registration.

The committee may also decide by majority vote to request prompt compensation of the customer or respondent of any monies due.

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[103] Ibid, Chapter 4.

APPENDIX J[104]

Floor Practices Hearing Committee-Disciplinary Actions

If the majority of the Floor Practices Hearing Committee decides that the member or employee of a member is guilty, this committee may:

a) Issue a cease and desist order.

b) Impose probation.

c) Impose a fine of $50,000 or less in addition to the "amount of any benefit received as a result of the violative action."

d) Suspend the member's floor broker registration or trading privileges for six months or less.

e) Deny access to the trading floor for 30 days.

f) "Direct the member to make an adjustment, in such amounts as are warranted by the evidence to the account of the customer injured by the conduct found to have violated the rules of the Exchange. The committee may also find that the evidence warrants an adjustment of the account of a customer where a member, though not in violation of an exchange rule, has not fulfilled his responsibility for proper execution of a customer's order."

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[104] Ibid, Chapter 4.

APPENDIX K[105]

Summary Proceedings

A "summary proceeding" is conducted by the Pit Vice Chairman or in his absence the Divisional Vice Chairman or in his absence, the General Chairman or three members of the Pit Committee "of the pit in which the incident occurred or if necessary, members of pit committees from other pits." The "summary proceeding" takes place at the end of trading on the day in which the charges were made, if possible. The respondent, without counsel, is allowed to appear before the committee. If a majority of the committee finds the member guilty then certain fines will be assessed,[106] or if the infraction is significant enough it will be referred to the Probable Cause Committee or Board for further review. A member found guilty may also appeal his verdict within 10 days to the Floor Practices Committee whose verdict is final.

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[105] Ibid, Chapter 4.

[106] "The following schedule of fines shall apply to members found guilty by the Pit Committee of "trading infractions:"

First Offense .....not to exceed $1000
Second Offense within six months..not to exceed $3,000
Third Offense within six months...not to exceed $5,000

APPENDIX L[107]

Appeal Procedures to the Board of Governors

The appeal will be heard by the Board or a hearing committee of six governors none of which may have participated in the original hearing. The Board will not "set aside, modify or amend the decision appealed" unless it determines the decision was:

a) "Arbitrary and capricious, an abuse of discretion, or not in accordance with the Rules of the exchange;"

b) Beyond the committee's authority jurisdiction or limitations;

c) Without observance of required procedures

d) Unsupported by "substantial" evidence or facts.

Members affected by a "summary action" resulting from an emergency situation may, within two days after receipt of notice, request a hearing before the Board. Modification or reversal by the Board will only occur if the action was: (a) arbitrary and capricious, or an abuse of discretion (b) lacking a "reasonable basis in fact", or (c) taken in "bad faith". Board rehearings may be requested by a member within 10 days of the original Board action.

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[107] Ibid, Chapter 4.

APPENDIX M[108]

Arbitration Hearing and Appeals Process

The arbitration process begins when a dispute arises between two members and one files a claim and arbitration fee with the Compliance Department. The statute of limitation for arbitration of a dispute is two years "from when the member knew or should have known of the transaction or occurrence which gave rise to the dispute." The President will review the complaint and refer it to a hearing by the Arbitration Committee or by another committee, or the Board. The President's notice of arbitration starts a 10 day period during which the other party in the dispute may file a written appeal to the Board regarding arbitrability or a 21 day period in which "the defending member [may] file a written response to the claim." An "unexcused" failure to respond constitutes an admission to the facts alleged in a claim.

The Arbitration Committee has an Agricultural and Financial Division, each with a chairman and alternate Chairman who are Board Governors and 35 members who are not. Upon the President's referral of a claim, the Chairman of the appropriate division and five members selected by the President will form a hearing panel. Each party to arbitration may request the removal of one member, whom the President will replace with an alternate.

The Arbitration panel will consider documents and testimony provided by the two parties who may be represented by counsel and may require testimony of any member or persons employed or associated with the member. "The panel (will) be the sole judge of the law and the facts," however, its may refer questions of law to the Exchange's legal counsel for opinion. The panel's final decision must be by majority vote. After the hearing the panel will

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[108] Ibid, Chapter 6.

provide the Compliance Department with their written decision to distribute to involved parties. "An award shall be satisfied within 3 days notice of receipt of the decision."

An appeal may be filed with the Board if the award is over $1,000 or non-cash. Within 3 days of the panel's decision, the appellant must provide the Compliance Department with a written notice of the grounds for the appeal (based on CME standards) as well as deposit cash, cashier's or a certified check with the Exchange equal to the value of the award. "In the case of non-cash awards, the filing of the notice of appeal shall not stay the decision appealed from unless the Board, the President or panel from which the appeal is taken specifically directs that the decision be stayed." The appellant and the appellee have successive 14 day periods to file all of their documents regarding on appeal. The President then determines if the full Board or a hearing committee will review the matter. The Board or Committee may "vacate" the award of the arbitration panel if:

a) The award was obtained by fraud or corruption.

b) There was "evident partiality or corruption" by an arbitrator(s).

c) The arbitrators were guilty of misconduct--"refusing to hear pertinent evidence or of any behavior by which the rights of any party have been prejudiced."

d) The arbitrators exceeded their authority.

e) The arbitrators "acted in manifest disregard of the applicable law.

If the Board or its hearing committee "vacates" the award, the matter will be resubmitted to a new arbitration panel. The Board or hearing committee may also modify or correct an award if there is a "material miscalculation or misdescription."

Arbitration fees and costs are met by a deposit from the initiating party and by the arbitrators assessment in the final decision.

APPENDIX N

The Special Trading and Settlement Relationship Between the Singapore International Monetary Exchange (SIMEX) and the Chicago Mercantile Exchange (CME)[109]

SUMMARY

In 1984, the Gold Exchange of Singapore reconstituted itself into the SIMEX in concert with the CME.

By adopting identical contracts for similar instruments, the contracts became fungible between the exchanges.

Mutual offset trading between the SIMEX and the CME became possible where contracts opened in one exchange could be closed in the other.

This mutual offset system provides opportunities for (1) operating efficiencies, (2) cost reductions, and (3) improved risk management.

While most types of risk are addressed effectively by the operating rules for the mutual offset, some risks remain.

Because the Mutual Offset Settlement Account is maintained with banks in New York, problems with settlement are likely to fall to the U.S. authorities and courts.

BACKGROUND

In 1984, when the SIMEX and CME entered into their mutual offset trading agreement, the SIMEX was trading futures on gold, Deutschmarks, Yen, and Eurodollar 3-month contracts. All but gold were subject to the special mutual offset agreement between the exchanges.

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[109] Federal Reserve Bank of New York, Payments System Studies Staff.

Since 1984, pound sterling futures were added to the agreement (in July 1986). In addition, the CME and SIMEX have been actively pursuing the ability to trade Nikkei 225 future ("the only stock-index futures contract available for the Japanese stock market.")[110]

The Monetary Authority of Singapore has actively supported the SIMEX and the development of mutual offset trading. Originally, it was a direct participant with two seats on the SIMEX board of directors. More recently, it has assumed the stance of an outside regulator and supervisor.

OPERATION OF THE MUTUAL OFFSET SYSTEM

Mutual offset trading allows contracts opened on one exchange to be closed on the other. Thus, open positions can be covered after the local market closes before price differentials widen during unfavorable movements. Transactions are booked where trades are opened with information provided to the contra exchange as necessary to net out trades when both exchanges are involved. A single deposit of margin money is maintained by clearing members to support trading in both markets, and a single Mutual Offset Settlement Account is used for the net balance between the two exchanges. Both are adjusted at least twice each business day after the close of each exchange.

The operation of the mutual offset for inter-exchange trading is as follows:

The originating clearing member contacts an authorized clearing member on the executing exchange to execute a trade.

The executing member executes the trade and confirms it to the originating member. Local clearing of the trade takes place normally.

Each member submits a trade confirmation record to its exchange.

The SIMEX and CME exchanges confirm the information on the records.

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[110] The CME originally sublicensed SIMEX to trade Nikkei 225 futures in May 1985, and the Commodity Futures Trading Commission (CFTC) authorized the SIMEX to offer Nikkei 225 futures in the U.S. at the end of 1986. The CME recently received approval from the CFTC to list the Nikkei 225 for trading.

For transactions across the two exchanges, each exchange provides an inter-exchange memorandum to the Inter Exchange Administrator (currently the CME) who compares the memoranda to determine for each transaction if all the requirements for the Inter Exchange Transfer have been satisfied.

If all requirements are met, transfer occurs.

Inter-exchange memoranda are processed and settled twice in every 24 hour period: (1) at 11:00 p.m. Chicago time at the completion of local clearing on the CME; and (2) at 8:00 a.m. Chicago time at the end of local clearing in Singapore (either 8:00 or 9:00 p.m. Singapore time depending on daylight savings time). [See Chart.] Obligations of clearing members are to their own clearinghouse. Local clearing is on a gross basis. The mutual offset is on a net basis in order to reduce inter-exchange exposure. Transfers to the originating exchange take place after the completion of the matching cycle with the originating exchange substituted for the executing clearing member as obligor. The executing clearing member has no liability to the executing exchange after the inter-exchange transfer. Each exchange has a holding account at the other exchange which represents the position of one exchange on the other exchange's books. The balance is the result of the Inter Exchange Transfers and the Mutual Offset System.

RISK ASSESSMENT OF THE MUTUAL OFFSET SYSTEM

Under the rules of operation, the legal risk is primarily governed by the laws of the United States and the State of New York at the choice of the SIMEX and CME. In addition, the margin account and the Mutual Offset Settlement Account are held by U.S. banks in New York.

Market or price risk is supervised directly and in a parallel fashion by the exchanges in several ways. First, there is an active program of market surveillance incorporating special call reports and large position reports (over 100 contracts for gold, currencies, Eurodollar and Nikkei Stock Average futures). Speculative position limits for the SIMEX are established to

be identical or lower than the similar limits on the CME. Intra- and inter-market risks are made comparable by use of identical contracts.

The credit risks associated with an exchange being unable to fulfill it obligations are addressed in several ways. First, each exchange maintains a **margin account** to support the net position in the holding account at the other exchange. This account is held with a New York bank. The funds cannot be commingled with funds held for any other purpose. The margin account can be in cash, U.S. Government securities, or a letter of credit. Funds for margin maintenance are due at 8:00 a.m. New York and Singapore time at the respective exchanges.

A **Settlement Variation** is used to mark to market each contract to a settlement price. The **Mutual Offset Settlement Account** is set up and administered by the SIMEX to handle payments and receipts resulting from settlement variation. The balance maintained in the Mutual Offset Settlement Account is the net position of the settlement variations. The Inter Exchange Administrator notifies each exchange one hour before settlement of the amount that needs to be paid into the account.[111] Because of the time differences between the two exchanges, the

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[111] According to the terms of the Mutual Offset Agreement, each exchange will deposit and maintain margin on account in an amount commensurate with the number of net open positions in its holding account (a position account maintained by each exchange to facilitate the inter-exchange clearing of trades). Margin for the CME will be equal to the total of the number of net open positions in its holding account multiplied by the margin required for each position. For the SIMEX, margin will be calculated using two methods and will be equal to the higher of the two resulting margin amounts.

Under the first method, based on all net open positions, the weighted average margin for all positions will be calculated. For the first 8000 positions, margin will always equal the weighted average margin multiplied by the number of positions. For positions in the 8001-12,000 range, margin will always be calculated as follows: (number of positions in this range X average weighted margin X 1.5); for positions in the 12,001-15,000 range, the calculation will be (number of positions in this range X average weighted margin X 2.0); and for all positions 15,001 and above, the calculation will be (number of positions in this range X weighted average X 3.0). The total margin under method one will be the sum of the margins calculated for all ranges.

Under the second method, the Eurodollar positions will be considered first when calculating margin requirements. For the first 3500 Eurodollar positions, margin will be equal to (number of Eurodollar positions in this range X Eurodollar margin X 1.0); in the 3501-7000 position range it will be (number of Eurodollar positions in this range X Eurodollar margin X 1.5); in the 7001-9000 range, it will be (number of Eurodollar

(continued...)

SIMEX may use a line of credit to provide the funds needed to make payment of the settlement variation whenever its net debit position increases and it must add funds to the Mutual Offset Settlement Account. The account is collateralized by the SIMEX and CME taking out letters of credit (denominated in U.S. dollars) with the other as the beneficiary.[112] If required payments are not made due to a default, the collateral can be drawn upon to satisfy the obligation.[113]

Once the Inter Exchange Transfer is complete, the originating exchange is substituted for the executing clearing member as obligor. To protect itself, the SIMEX requires initial and maintenance margins for both clearing members and customers. Additionally, net capital requirements are specified for clearing members, and clearing members must furnish a banker's guarantee.

Settlement risk is addressed by operating **procedures for deliveries** and specific rules for **payment default and emergency actions.** For normal deliveries, each exchange maintains an account at a bank for the purpose of receiving and paying out dollars and other currencies (or commodities) as specified in maturing contracts. For foreign currency clearings, clearing members make deliveries related to their own exchange with the excess position of the exchange credited to the Holding Account of the other exchange. The exchanges then release

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[111](...continued)
positions in this range X Eurodollar margin X 2.0); and for all positions 9001 and above, margin will be (number of Eurodollar positions in this range X Eurodollar margin X 3.0). Total Eurodollar margin under method two will be the sum of the margin amounts calculated for each range. Next, the margin requirements for Japanese yen, British pounds, and Deutsche marks will be calculated by multiplying the number of net positions in each commodity by the margin amount assigned to each position. Margin for all commodities will be combined for a total. Total SIMEX margin will be the greater of this amount or the amount calculated under method one.

[112] The SIMEX is the beneficiary for negative account balances. The CME is the beneficiary for positive balances. The letters of credit must be from U.S. banks acceptable to the beneficiary.

[113] As a further backstop, the SIMEX maintains a standby letter of credit facility of US$5 million for this purpose.

foreign currency and dollars to their own members.

The mark-to-market procedures in place for the Mutual Offset Settlement Account assure that the Eurodollar cash contract settlement procedure creates no additional price exposure for either exchange because the offsetting positions are already marked to the same final settlement price.[114]

With default, the non-defaulting exchange may apply margin deposits, security deposits and other assets. In addition, with payment default, the exchange has the right to suspend the mutual offset system or take emergency action.

When an emergency situation arises in the market, emergency action may "be taken by either of the Exchanges with respect to any designated futures contract." The exchange declaring the emergency may take "appropriate action to the extent permitted by its rules."[115] The exchange declaring the emergency must normally consult with the other exchange before taking action unless the governing body of the former exchange acts unanimously. If any liquidation takes place, settlement variation is calculated for each position liquidated.

Sovereign risk is addressed by the mutual offset rules. Government action can cause extraordinary termination of the mutual offset system.

SUPERVISORY OVERSIGHT BY MONETARY AUTHORITIES

The Monetary Authority of Singapore was actively involved in SIMEX's establishment of the mutual offset trading agreement with the CME. It continues to play some, as yet undetermined, role in the day to day supervision and regulation of the SIMEX.

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[114] What is not addressed in these procedures is how delivery is handled in atypical but plausible cases such as power outages, etc. While such events could be addressed in the context of emergency action, information on normal market practices is needed. The CME has indicated that market closings are treated the same as holidays.

[115] Such actions may "have the effect of modifying the contract specifications or of altering the final delivery date of any designated futures contract."

The Commodities Futures Trading Commission provides direct supervision of the CME with respect to its mutual offset trading activities.

The Federal Reserve was initially involved with the establishment of CME-SIMEX mutual offset trading through its review of bank holding company applications for organizations wishing to establish commodities futures trading corporations within the holding company to deal in this market. The activity was reviewed in some detail at that time (1984). Ongoing oversight is indirect through periodic inspections of subsidiaries of bank holding companies dealing in the CME-SIMEX market. As such, the Federal Reserve's oversight is limited to a small subset of the market participants and focused exclusively on their individual activities.

APPENDIX O[116]

SPAN SYSTEM DESCRIPTION

Introduction

SPAN finds the overall risk in a complete portfolio. It treats futures and options uniformly, while recognizing the unique features of options. It also offers both inter-month and inter-commodity spreading.

Yet SPAN is simple and compact.

The firms will not need to run option pricing models. The CME mainframe will do all option pricing and will transmit the results to the firms or to their service bureaus as simple dollar value changes. The firms will apply portfolio positions to these dollar losses and will use basic arithmetic to calculate the margins.

Theory

SPAN covers a portfolio's risk. This risk is the largest loss that a portfolio might reasonably suffer. For example, the CME Margin Subcommittee may set the SPAN parameters to cover the largest loss that might occur 95% of the time.

In standard option pricing models, three factors affect option values:

- Futures price
- Volatility (variability) of futures price
- Time to expiration

As these factors change, futures and options gain or lose value. SPAN constructs scenarios of futures price changes and volatility changes to see what the entire portfolio might

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[116] "DAR Overview" by the Chicago Mercantile Exchange, September 1, 1988, revised April 1989.

reasonably lose in one day. The SPAN margin then covers this largest reasonable one-day loss.

Risk Arrays

As it scans the futures price ranges and volatility ranges each day, the CME mainframe will calculate the gain or loss from each scenario. It will store these dollar gains and losses in Risk Arrays.

Each futures contract and each option may react differently to the various scenarios, so each has its own Risk Array. The arrays summarize value gains or loses in these scenarios. The CME mainframe will update these arrays every day.

Appendix Ia shows a sample Risk Array for a Deutsche mark call option. Appendix Ib shows a sample Risk Array for a Deutsche mark futures contract.

The CME will transmit these Risk Arrays to the firms or to their service bureaus. The firms or service bureaus will use the dollar values in their processing. They will not need to run any option pricing models.

The Risk Arrays for all CME markets would fit on one PC floppy disk with room to spare.

Scanning Risk Charge

SPAN scans futures price changes and volatility changes to find the resulting portfolio value gains or losses.

SPAN starts at the current futures settlement price and scans up and down three intervals of futures price moves. At each futures price, SPAN also scans up and down a range from the current futures volatility. The CME Margin Subcommittee will determine these scan ranges for each commodity.

Deep-out-of-the-money short options pose a special problem. As they get close to expiration, they may not face risk from normal futures price moves. But unusually large

futures price moves may cause these options to move into the money and then to suffer large losses.

To cover this possibility, SPAN also scans up and down twice the normal futures price range. Since these unusually large price moves are so rare, SPAN then covers only a fraction of the resulting losses.

In all, SPAN scans 16 different scenarios of futures price changes and volatility changes. SPAN then selects the largest portfolio loss for these 16 combinations. This largest reasonable loss is the single commodity's Scanning Risk Charge.

Appendix II shows how SPAN scans through these scenarios and then calculates a margin for a simple Deutsche mark portfolio.

Composite Delta

SPAN uses deltas to form spreads.

Deltas measure how a futures contract's or an option's value reacts to underlying futures price changes. Futures deltas are 1.0, while option deltas range from -1.0 to +1.0. As the futures price changes, an option's delta typically also changes.

To reduce processing, SPAN uses only one Composite Delta per Risk Array. This Composite Delta is a weighted average of deltas from across the futures price scanning range.

Some futures price moves are more likely than others. The deltas corresponding to likely price moves get more weight in the average. The deltas corresponding to unlikely price moves get less weight in the average.

The CME mainframe will update and transmit these Composite Deltas each day.

Inter-month Spread Charge

As SPAN scans futures prices within a single commodity, it assumes that price moves correlate perfectly across contract months. Since price moves in different months do not

generally correlate perfectly, SPAN adds an Inter-month Spread Charge to each commodity's Scanning Risk Charge. This Inter-month Spread Charge covers the portfolio's inter-month basis risk in each commodity.

For each commodity, SPAN finds the net delta in each contract month. It then adds up the net delta in all net long months and adds up the net delta in all net short months. SPAN forms spreads between delta in long months and delta in short months until it exhausts either long or short delta.

SPAN then charges the commodity's Inter-month Spread Margin Rate for each spread. SPAN adds this total Inter-month Spread Charge to the commodity's Scanning Risk Charge.

SPAN can also support a two-tiered spread structure if the spread rates differ from the front months to the back months. For example, SPAN can support the current two-tiered Eurodollar and Pork belly spread rates.

Delivery-Month Charge

Some commodities may require an extra margin charge for delivery-month spreads and outrights.

Where necessary, SPAN adds this extra Delivery-Month Charge to the commodity's Scanning Risk. Only a few commodities now require this extra charge, and then only when they are in their delivery months.

In most cases, SPAN can currently skip this calculation.

Inter-commodity Spread Credits (OPTIONAL)

SPAN offers an optional Inter-commodity Spread Credit procedure. While this procedure is simple and accurate, firms may choose to bypass this credit.

Futures price moves tend to correlate fairly well between related commodities. As related futures prices move, gains from net long positions in one commodity tend to offset losses from net short positions in another. To recognize this risk reduction, SPAN forms inter-commodity spreads between offsetting positions in related commodities. These spreads then generate margin credits.

The CME Margin Subcommittee will identify groups of related commodities and will set priorities for forming different possible spreads between positions in the groups.

Within a commodity group, SPAN finds the net delta for each commodity and then uses an automatic priority rule to form spreads between long and short delta.

In some portfolios, many different spreads may be possible. Spreads that save more over the outright margins may have higher priority. Spreads that save less may have lower priority.

Each futures spread saves a percentage of the total outright margin for the two spread commodities. SPAN uses this percentage saving to generate credits against the outright margins. The more of a commodity's delta that goes into spreads, the larger the spread credits for that commodity. For example, offsetting futures and deep-in-the-money options may allow the largest SPAN Inter-commodity Spread Credits.

SPAN forms these inter-commodity spreads from net delta. Since delta only affects futures price risk, SPAN uses these delta-based spreads to adjust only futures price risk.

Volatility risk and time risk are separate from delta. SPAN does not use these spreads to adjust either volatility risk or time risk. So delta-neutral positions may generate only small Inter-commodity Spread Credits, or even no Spread Credits at all.

Short Option Minimum Charge

Short options that are extremely deep-out-of-the-money may appear to have no risk at all throughout the entire scanning range.

To cover the small chance of losses on these options, SPAN requires a minimum charge for each short option in the portfolio. The CME Margin Subcommittee will set a short option minimum rate for each commodity.

The total of all short option charges within a group of related commodities is the Group Short Option Minimum. Risk Margin for the group cannot fall below this minimum.

For example, suppose that the Deutsche mark short option minimum rate is $50 per option. Then a portfolio containing only 20 short Deutsche mark calls must have a margin of at least $1000, no matter what results come from other SPAN calculations.

Portfolio Risk Margin

Within each group of related commodities, SPAN adds up the Scanning Risk Charges, the Inter-month Spread Charges, and any Delivery Month Charges.
SPAN then subtracts any Inter-commodity Spread Credits for all inter-commodity spreads.

SPAN compares the result to the Group Short Option Minimum Margin. It does not add the Short Option Minimum to any other charges.

Risk Margin for the commodity group is either the sum of the group's charges and credits or the group's Short Option Minimum, whichever is larger.

To find the Portfolio Risk Margin, SPAN adds up the Group Risk Margins for all commodity groups in the portfolio.

APPENDIX Ia: SAMPLE OPTION RISK ARRAY
2222DM Call at 60 Strike: Futures Settlement = $0.60

All losses are positive numbers.
All gains are negative numbers.

Line	Value Loss	Scenario
1	-$ 50	Futures unchanged, Volatility up
2	$ 110	Futures unchanged, Volatility down
3	-$ 420	Futures up 1/3 range, Volatility up
4	-$ 250	Futures up 1/3 range, Volatility down
5	$ 260	Futures down 1/3 range, Volatility up
6	$ 420	Futures down 1/3 range, Volatility down
7	-$ 830	Futures up 2/3 range, Volatility up
8	-$ 680	Futures up 2/3 range, Volatility down
9	$ 520	Futures down 2/3 range, Volatility up
10	$ 670	Futures down 2/3 range, Volatility down
11	-$1290	Futures up 3/3 range, Volatility up
12	-$1150	Futures up 3/3 range, Volatility down
13	$ 730	Futures down 3/3 range, Volatility up
14	$ 860	Futures down 3/3 range, Volatility down
15	-$ 720	Futures up extreme (Cover 25% of loss)
16	$ 290	Futures down extreme (Cover 25% of loss)
17	0.50	Composite Delta

These numbers are for illustration only. The CME Margin Subcommittee will set the parameter values that determine the actual margin numbers.

These scenarios scan across futures price moves (range = $2000) and volatility moves (range = 1%). Losses compare today's theoretical value to the next day's theoretical value for the scenarios.

APPENDIX Ib: SAMPLE FUTURES RISK ARRAY
DM Futures Contract

All losses are positive numbers.
All gains are negative numbers.

Line	Value Loss	Scenario
1	$ 0	Futures unchanged, Volatility up
2	$ 0	Futures unchanged, Volatility down
3	-$ 670	Futures up 1/3 range, Volatility up
4	-$ 670	Futures up 1/3 range, Volatility down
5	$ 670	Futures down 1/3 range, Volatility up
6	$ 670	Futures down 1/3 range, Volatility down
7	-$1330	Futures up 2/3 range, Volatility up
8	-$1330	Futures up 2/3 range, Volatility down
9	$1330	Futures down 2/3 range, Volatility up
10	$1330	Futures down 2/3 range, Volatility down
11	-$2000	Futures up 3/3 range, Volatility up
12	-$2000	Futures up 3/3 range, Volatility down
13	$2000	Futures down 3/3 range, Volatility up
14	$2000	Futures down 3/3 range, Volatility down
15	-$1000	Futures up extreme (Cover 25% of loss)
16	$1000	Futures down extreme (Cover 25% of loss)
17	1.00	Composite Delta

These numbers are for illustration only. The CME Margin Subcommittee will set the parameter values that determine the actual margin numbers.

These scenarios scan across futures price moves (range = $2000) and volatility moves (range = 1%). Losses compare today's theoretical value to the next day's theoretical value for the given scenarios.

APPENDIX II: SAMPLE PORTFOLIO SCANNING RISK CALCULATION

SINGLE COMMODITY WITHOUT INTER-MONTH SPREADS

Positions in Portfolio:

1 long June Deutsche mark call at 59 strike.
2 short June Deutsche mark calls at 60 strike.
1 short June Deutsche mark call at 61 strike.

Line		59 Strike	60 Strike	61 Strike	Total Loss
1	+	(1 * -$ 50)	- (2 * -$ 50)	- (1 * -$ 50)	= $ 100
2	+	(1 * $ 100)	- (2 * $ 110)	- (1 * $ 110)	= -$ 230
3	+	(1 * -$ 510)	- (2 * -$ 420)	- (1 * -$ 320)	= $ 650
4	+	(1 * -$ 370)	- (2 * -$ 250)	- (1 * -$ 150)	= $ 280
5	+	(1 * $ 360)	- (2 * $ 260)	- (1 * $ 170)	= -$ 330
6	+	(1 * $ 520)	- (2 * $ 420)	- (1 * $ 310)	= -$ 630
7	+	(1 * -$1010)	- (2 * -$ 830)	- (1 * -$ 630)	= $1280
8	+	(1 * -$ 890)	- (2 * -$ 680)	- (1 * -$ 460)	= $ 930
9	+	(1 * $ 720)	- (2 * $ 520)	- (1 * $ 340)	= -$ 660
10	+	(1 * $ 880)	- (2 * $ 670)	- (1 * $ 460)	= -$ 920
11	+	(1 * -$1540)	- (2 * -$1290)	- (1 * -$1000)	= $2040 **
12	+	(1 * -$1450)	- (2 * -$1150)	- (1 * -$ 840)	= $1690
13	+	(1 * $1020)	- (2 * $ 730)	- (1 * $ 470)	= -$ 910
14	+	(1 * $1180)	- (2 * $ 860)	- (1 * $ 570)	= -$1110
15	+	(1 * -$ 830)	- (2 * -$ 720)	- (1 * -$ 580)	= $1190
16	+	(1 * $ 420)	- (2 * $ 290)	- (1 * $ 180)	= -$ 340

Commodity Scan Risk = Largest Total Loss from scanning = $2040

Parameters: Current futures = 0.60 Scan range = 0.012
Current volatility = 15% Scan range = 1%
Days to expiration = 45 Interest = 8%

APPENDIX IIIa: MARGINS UNDER VARIOUS SYSTEMS
(For futures settlement prices from 57 thru 63)

Position: Long 1 Deutsche mark call at 60 strike 5 days to expiration.

Futures Settle	57	58	59	60	61	62	63
SPAN Margin	$0	10	120	520	1230	1800	1980
Delta Margin	$4	55	342	1006	1656	1937	1993
Customer Margin	$1	13	118	525	1372	2513	3747

Position: Long 1 Deutsche mark call at 60 strike 30 days to expiration.

Futures Settle	57	58	59	60	61	62	63
SPAN Margin	$160	320	560	860	1180	1470	1690
Delta Margin	$240	440	707	1010	1307	1557	1741
Customer Margin	$178	386	742	1278	2004	2902	3936

These margin numbers are for illustration only. The CME Margin Subcommittee will set the parameter values that determine the actual margin values.

These numbers represent money posted to cover portfolio risk. This money may not be applied against other requirements.

The SPAN Margin is the haircut applied to long option value. The Delta Margin is the position net delta times the Futures Maintenance Margin.
The Customer Margin represents the payment of premium.

The parameter values used here are:

Futures Scan Range = Futures Maintenance Margin = $2000/contract
Volatility = 15%
Volatility Scan Range = 1%
Interest Rate = 8%

APPENDIX IIIb: MARGINS UNDER VARIOUS SYSTEMS
(For futures settlement prices from 57 thru 63)

Position: Short 1 Deutsche mark call at 60 strike 5 days to expiration.

Futures Settle	57	58	59	60	61	62	63
SPAN Margin	$140	380	820	1500	1880	1980	2000
Delta Margin	$475	475	475	1006	1656	1937	1993
Customer Margin	$551	763	1493	2525	3372	4513	5747

Position: Short 1 Deutsche mark call at 60 strike 30 days to expiration.

Futures Settle	57	58	59	60	61	62	63
SPAN Margin	$450	710	1000	1290	1540	1730	1850
Delta Margin	$475	475	707	1010	1307	1557	1741
Customer Margin	$728	1136	2117	3278	4004	4902	5936

These margin numbers are for illustration only. The CME Margin Subcommittee will set the parameter values that determine the actual margin values.

These numbers represent money posted to cover portfolio risk. This money may not be applied against other requirements.

The parameter values used here are:

Futures Scan Range = Futures Maintenance Margin = $2000/contract
Volatility = 15%
Volatility Scan Range = 1%
Interest Rate = 8%

APPENDIX IIIc: MARGINS UNDER VARIOUS SYSTEMS
(For futures settlement prices from 57 thru 63)

Position: Long 1 Deutsche mark straddle at 60 strike 5 days to expiration.

Futures Settle	57	58	59	60	61	62	63
SPAN Margin	$1960	1600	650	220	670	1610	1960
Delta Margin	$1991	1889	1313	14	1315	1877	1987
Customer Margin	$3747	2524	1484	1049	1495	2529	3748

Position: Long 1 Deutsche mark straddle at 60 strike 30 days to expiration.

Futures Settle	57	58	59	60	61	62	63
SPAN Margin	$1370	900	400	220	440	950	1390
Delta Margin	$1507	1106	572	34	626	1126	1495
Customer Margin	$4081	3257	2726	2556	2766	3320	4146

These margin numbers are for illustration only. The CME Margin Subcommittee will set the parameter values that determine the actual margin values.

These numbers represent money posted to cover portfolio risk. This money may not be applied against other requirements.

The SPAN Margin is the haircut applied to long option value. The Delta Margin is the position net delta times the Futures Maintenance Margin.
The Customer Margin represents the payment of premium.

The parameter values used here are:

Futures Scan Range = Futures Maintenance Margin = $2000/contract
Volatility = 15%
Volatility Scan Range = 1%
Interest Rate = 8%

APPENDIX P[117]

Floor Trader Margin Calculation

A floor trader or member calculates their margin position as follows:

1. Match futures contracts of the same commodity type and assess the futures spread rate on these contracts.

2. Determine if there are any short options that cannot be spread with another futures or options contract, and which after calculating the short options margin require the minimum payment.

3. For all other option related positions:

   a) The remaining long futures contracts in a commodity are assigned a risk factor of -1.0. The remaining short futures contracts in that commodity are assigned a risk factor of 1.0

   b) "Assign a negative risk factor for each long call or short put and a positive risk factor for each short call or long put in the account." The Exchange provides the risk factors.

   c) Add all the risk factors, multiply by the CME designated dollar amount, omit negative signs from totals.

4. Calculate the margin on all other CME contracts.

5. Add together the results from 1, 2, 3, and 4, subtract option equity[118] account from this total.

6. If the results of "5" are positive, that is the required margin. If the results are negative no margin is required. "The amount represents the magnitude of a cash loan the [clearing member] can make to the account."

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[117] "Clearing House Manual of Operations" by The Chicago Mercantile Exchange, Section IV Margins, Settlements and Premiums.

[118] Option equity of an account equals the "sum of the settlement prices of all long options minus the sum of the settlement prices of all short options."

APPENDIX Q[118]

Margin Requirements by Contract for Public Customers

Calculation of public customer margin follows the description set out below:

If a public customer sells a short option, the premium may be used to cover any of the following margin requirements.

a. Naked Options

1. Long - Full premium payment

2. Short - Premium marked to market plus futures margin on underlying futures contract (speculative or hedge) less 1/2 the amount the option is out of the money. Margin must be at least the premium plus minimum required by the Exchange.

b. Option/Future Spreads

1. Long Call - Short Futures or

   Long Put - Long Futures within a commodity

   Futures hedge margin minus option premium marked to market (must be positive). "A cash loan may be granted on the position up to the amount the option is in-the-money to finance settlement variation on the related futures contract. Such loan amounts are added to the margin required on the position."

2. Short Call - Long Futures or

   Short Put - Short futures within a commodity

   Option premium is marked to market, to which is added a futures hedge margin reduced by 1/2 the amount the option is in the money. Margin can not be "less than the premium" plus the minimum set forth by the CME.

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[118] Ibid, Section IV, Margins, Settlement and Premiums.

c. Option/Option Spreads

1. Vertical - This spread combines long and short calls or long and short puts; each long and short grouping has the same expiration date but with different strike prices.

   a) Bull Spread Calls

      Long call, lower exercise price than short call = No Margin

      Bear Spread Puts

      Long put, higher exercise price than short put = No Margin

   b) Bear Spread calls

      Long call, higher exercise price than short call

      Bull Spread Puts

      Long put, lower exercise price than short put

      Margin =

   Lesser of
   1. Difference in exercise price of the options, or
   2. Futures hedge margin plus the excess of the short option premium over the long option premium

2. Horizontal Spreads - This spread combines a long call with a short cal or long put with a short put. Long and short strike prices are the same expiration dates are different.

   a) Long expiration date exceeds short = no Margin

   b) Short expiration date exceeds long

      Margin =

      1. Futures Spread margin, and
      2. Excess of short premium over the long

3. Mixed Spread - This spread includes long calls and short calls or long puts and short puts, within each group, the maturity date and exercise price are different.

   a) Long call, lower exercise price than short call

      Long put, higher exercise price than short put

      Margin =

      1. Futures spread margin, and

      2. Excess of short premium over the long

   b) Long call, higher exercise price than short call

      Long put, lower exercise price than short put

      Margin=

      1. Excess of short option premium over long, and

      2. Lesser of (a) Difference in the strike price

         (b) Futures hedge margin.

4. Butterfly Spread - This spread involves four options of which all are either puts or calls. The two long options or the two short options have the same exercise price which must "lie between the exercise prices for the remaining two options." In effect this is a vertical Bull Spread combined with a vertical Bear spread.

   a) If premiums for the two long contracts combined exceed the premiums of the two short contracts, all of which are marked to market

      and

      the strike price of two coincide exactly halfway between the remaining strike prices

      = No margin

b) If premiums for the two short contracts combined exceed the two long contracts, all of which are marked to market

or

the strike price of the two which coincide is not halfway between the remaining strike prices.

Margin = "Largest difference between two adjacent strike prices, not to exceed futures hedge margin plus the amount by which short option premiums exceed long option premiums."

5. Box Spreads - This spread includes four options with the same expiration date; the exercise price for the Long call and short put are the same as well as the short call and long put.

a) The combined premiums for long contracts, marked to market, are greater than the combined premiums for short contracts

= No margin.

b) The combined premiums for short contracts marked to market, are greater than the combined premiums for long contracts

Margin = Difference in the strike prices

6. Vertical Straddles - This involves a short call and a short put with the same expiration date and exercise price.

Margin = (1) Premium on two short options contracts marked to market, and

(2) One futures hedge margin

7. Vertical Strangles - This involves a short call and short put with the same expiration date and different exercise prices.

Margin = Two separate margins for each short contract.

Conversions and Reverse Conversions

"Conversions = Long Futures/Short Call/Long Put

Reverse = Short Futures/Long Call/Short Put

The exercise price and month are the same."

Margin = Short options contract premium less the long options contract premium marked to market. Negatives are not acceptable. "Cash loan can be granted by a firm to its customer to finance settlement variation on futures as under - Option - Futures Spreads."

A Study of Large-Dollar Payment Flows Through CHIPS and Fedwire

December, 1987

A STUDY OF LARGE-DOLLAR PAYMENT FLOWS THROUGH CHIPS AND FEDWIRE

The nation's two large-dollar electronic payments systems--the New York Clearing House Interbank Payments System (CHIPS) and the Federal Reserve wire transfer network (Fedwire)--together process electronic payments of funds in New York City in amounts that now approach $1 trillion per day. Yet, despite the huge sums of money involved, very little quantitative information has been available on the nature and composition of the payments going through these electronic networks. The purpose of this study is to address that informational deficiency through an analysis of a sample survey of one day's payments traffic through the two networks.

This study is the product of a joint effort between the Federal Reserve Bank of New York, nine large New York Clearing House banks, and four foreign banks with New York City offices that are active participants in CHIPS. The nine Clearing House banks, which participated in both the CHIPS and the Fedwire survey, were The Bank of New York; Bankers Trust Company; The Chase Manhattan Bank, N.A.; Chemical Bank; Citibank, N.A.; Irving Trust Company; Manufacturers Hanover Trust Company; Marine Midland Bank, N.A.; and the Morgan Guaranty Trust Company. The four foreign banks, which were asked to participate in the CHIPS survey only, were The Bank of Tokyo; Barclays Bank PLC; Credit Lyonnais and Dresdner Bank. The substantial work involved in researching

the nature and purpose of the transactions was done entirely by these 13 commercial banking organizations. The design of the sampling procedure and the analysis that follows were performed by the Federal Reserve Bank of New York.

The samples of payments that were given to the 13 participating banks to research were, of course, limited to payments processed through those organizations. For that reason, this is entirely a study of payments that flow through New York City, though of course such payments can and do have origins and destinations that are nationwide and worldwide. In any event, the prime purpose of the survey was to develop a better understanding of the linkages between the funds transfer networks and the New York and international financial markets, and the restricting of the survey to banks located in New York City was consistent with that purpose.

Approach, Structure and Quality of the Survey

Survey Approach

The approach taken in the survey was derived from a small pilot test undertaken earlier with the cooperation of Manufacturers Hanover Trust Company and Morgan Guaranty Trust Company. As a result of that test, the survey was restricted to payments messages sent by the participating banks and to payments in the amount of $1 million or more. The pilot test had indicated that there were no important differences between the nature and purpose of payments sent and received, and that little additional information could be gained by surveying from both perspectives. Also, limiting the

survey to messages sent by the participants made the task of researching the underlying business transactions much simpler, since survey participants needed in most cases only to contact their own customers for necessary third-party information. The size limitation of $1 million or more was imposed because few transactions of smaller size were found to be importantly related to the functioning of the national and international financial markets--the principal focus of the study. Moreover, while transactions of less than $1 million in size are fairly numerous on both CHIPS and New York Fedwire, they account for only a very minor percentage of the total value of transactions on either wire, and the extra effort of researching a representative sample of such transactions would not have produced commensurate informational benefits.

The pilot test also served to refine the questionnaires that were used to develop comprehensive information on wire transfers payments. The questionnaires were limited to six "Schedules" covering the following broad categories of transactions:

A. Dollar Transfer Related to Securities Purchase/Redemption/Financing
B. Bank Loan Transactions
C. Federal Funds Transactions
D. Commercial and Miscellaneous Transactions
E. Settlement Transactions
F. Dollar Transfers Related to Foreign Exchange/Eurodollar Placement.

Participants in the survey were asked to identify each transaction in the sample by one of these six broad categories and then to supply specific details about the nature and purpose of the transaction, contacting their customer as necessary to obtain the information. Copies of the six survey Schedules are attached as an Appendix.

Structure of the Sample

The survey samples were structured in such a way as to provide a reasonably representative sample of all transactions of $1 million or more in size, while assigning progressively greater importance to the larger size transactions. Thus, transactions ranging in size from $1 million to $5 million were sampled in relatively small percentages, those ranging from $5 million to $30 million were sampled at higher percentages, and transactions of $30 million or more were sampled 100 percent. Because the size distribution of payments on Fedwire and CHIPS differ rather substantially, some variation between the two in the sampling percentages below $30 million was necessary in order to keep the two samples at manageable and comparable size. Specifically, the two samples were drawn according to the following percentages by transactions size.

Table 1

Sampling Percentages by Payment Size Classification

	$1 - 5 Million	$5 - 30 Million	$30 Million & over
CHIPS	7 1/2%	20%	100%
Fedwire	15%	40%	100%

The samples were drawn from CHIPS and Fedwire payments traffic occurring on Wednesday, June 4, 1986, which turned out to be an essentially "normal" day on both wire transfer systems. Total CHIPS transactions that day came to 119,279, with an aggregate value of $432,446 million. Second District Fedwire payment originations numbered 55,636, with a total dollar value of $265,163 million. CHIPS closed the day on schedule at 4:30 p.m., while all three Fedwire closings were each delayed 30 minutes, due largely to a late (5:15 p.m) Fedwire securities close. Thus, Fedwire inter-district third-party close occurred at 5:30 p.m., intra-district third-party close was at 6:30 p.m., and final Fedwire close took place at 7:00 p.m.

On the survey day, the 13 banks participating in the CHIPS survey accounted for $204.9 billion of CHIPS payments of $1 million or more, or 48 percent of all the $426.5 billion total of all CHIPS payments of that size made that day. The nine banks participating in the Fedwire survey made $197,043 million of Fedwire payments of $1 million or more, or 76 percent of the $259,919 million total of all payments of that size outgoing through New York Fedwire on the survey date.

The totals of all Fedwire payments made by the nine banks participating in the Fedwire survey (the "population" sampled), broken down by numbers and dollar amounts within each of the sample payments size categories, were as follows:

Table 2

Fedwire Payments Sampled By Payments Size Classification

	$1-5 Million	$5-30 Million	$30 Million & over	Total
Numbers	5,350	4,958	1,528	11,836
Amounts ($ Millions)	$12,662	$61,652	$122,729	$197,043

And, the corresponding CHIPS payments totals on the survey date for the 13 participants in the CHIPS survey were:

Table 3

CHIPS Payments Sampled By Payments Size Classification

	$1-5 Million	$5-30 Million	$30 Million & over	Total
Numbers	16,725	10,642	1,127	28,494
Amounts ($ Millions)	$35,772	$97,232	$71,852	$204,857

Applying the sampling survey percentages shown in Table 1 to each survey participant's wire transfer message traffic yielded the following sample transactions totals and distribution across the three payment size classifications.

Table 4

Sample Totals and Distribution
By Payment Size Classification

	$1-5 Million	$5-30 Million	$30 Million & Over	Total
CHIPS	1,286	2,131	1,127	4,544
Fedwire	795	1,972	1,528	4,176

The CHIPS total sample of 4,544 messages was larger than that of Fedwire. However, the CHIPS sample included 516 messages drawn from the traffic of the four foreign banks participating only in the CHIPS survey. Thus, the CHIPS sample of transactions for the nine participating Clearing House Banks was slightly smaller in message size than the Fedwire sample, which was limited to the Clearing House bank participants only.

The value of payments encompassed by each of the samples was quite large in the aggregate, amounting to $94,372 million in the case of the CHIPS sample and $149,308 million for the Fedwire sample. The following table shows the distribution across each of the three sampling brackets of these sample total dollar amounts.

Table 5

Sample Payment Amounts in $ Millions
By Payment Size Classification

	$1-5 Million	$5-30 Million	$30 Million & Over	Total
CHIPS	$2,753	$19,512	$ 72,107	$ 94,372
Fedwire	$1,900	$24,680	$122,729	$149,308

Quantity, Quality and Generality of the Survey Results

The overall response rate to the survey was 61.2 percent for the CHIPS sample and 72.6 percent for the Fedwire sample. The numbers of responses and percentage of response rates within each sampling bracket were as follows:

Table 6

Survey Response Rates by Payment Size Classification

	$1-5 Million		$5-30 Million		$30 Million & Over		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
CHIPS	796	61.9%	1,320	61.9%	663	58.8%	2,779	61.2%
Fedwire	533	67.0%	1,341	72.4%	1,167	75.9%	3,041	72.6%

The somewhat lower response rates for the CHIPS survey was expected due to the greater difficulty of obtaining information on CHIPS customer payments. Customers originating a CHIPS payment are predominantly foreign-based and more hesitant about supplying specific payment information. Also, of course, a sizeable number of CHIPS payments originate in countries where disclosure is restricted by law or regulation. In this regard, of the nine Clearing House banks that participated in both the CHIPS and Fedwire surveys, seven showed lower response rates on their CHIPS samples than their Fedwire samples, and the other two had only slightly higher CHIPS response rates. Nonetheless, the response rates on both samples were very high by any standard.

The total dollar value of transactions captured by the survey results amounted to $55,652 million in the case of the CHIPS survey, and to $111,708 million for the Fedwire survey. These totals were distributed among the three sample payment size brackets as follows:

Table 7

Survey Payment Amounts in $ Millions By Payment Size Bracket

	$1-5 Million	$5-30 Million	$30 Million & Over	Total
CHIPS	$1,675	$11,881	$42,096	$ 55,652
Fedwire	$1,278	$17,117	$93,314	$111,709

The large disparity between the total payment amounts captured by the two surveys partly reflects the fact that the CHIPS sample was of smaller size in dollar terms than the Fedwire survey to begin with (see Table 5). However, the lower CHIPS survey response rates, particularly in the $30 million and over payment size category (58.8 percent versus 75.9 percent for Fedwire), were also a contributing factor.

Both the CHIPS and the Fedwire survey data are highly representative of the actual size distribution of transactions amounts included within their respective samples. Applying the survey data to predict the size distribution of transactions within the samples yields estimates that in no case differ by as much as two

percent from the actual dollar amounts contained within any of the three transactions size brackets of either sample. Moreover, a comparison of the response data against the samples using even finer breakdowns of transactions size show a similar degree of correspondence. This suggests that there is no significant bias in the survey results with respect to the size of transactions reported on, and, by implication, probably no significant bias as well in the broad types of transactions captured by the responses.

With respect to the level of transactional detail supplied by the survey participants, that also appears to have been quite good. Tables that are presented later show composite summaries of each of the survey reporting schedules received back from both the CHIPS survey and the Fedwire survey, and include lines labeled "unspecified" which quantify the informational elements that were missing from the reporting forms. In general, these "unspecified" lines account for a small percent of either transactions or dollar amounts, and even in those cases where the percentages run moderately high, the missing information does not appear to be especially material, given the corresponding large amount of specified information.

The fact that the reporting forms were returned with such a high degree of informational completeness tells nothing, of course about the accuracy of the information actually supplied. However, while the effort put into the survey did vary among the participating

banks, on balance it was quite thorough and should have produced reasonably reliable information. Beyond that, it simply is not possible to confidently assess the quality of the information, especially at the finer levels of detail called for in the reporting schedules.

As to the generality of the survey results, the fact that the survey was limited in the case of Fedwire to payments made by the nine largest Clearing House banks, and in the case of CHIPS to those same Clearing House banks plus four large, internationally prominent foreign banks, may render the results somewhat atypical of either of the two wire payments systems generally. However, in the case of New York Fedwire, which the nine sample banks dominated with 76 percent of payments dollar volume, the survey results as a matter of arithmetic cannot contain much sampling bias. Moreover, while the sample banks in the CHIPS survey accounted for less than half of the dollar volume on CHIPS, there is little reason to expect that the character of traffic of other CHIPS participants is systematically different in important degree from that captured in the sample. But, in any event, because the sample did not encompass all institutions participating on CHIPS and New York Fedwire, some question about the broad generality of the results for either of the wire systems in aggregate remains, and this is particularly true for the finer transactional breakdowns.

The Nature and Purpose of CHIPS & Fedwire Payments

Table 8 on the next page breaks down the CHIPS and Fedwire survey data by the broad survey transactions categories, showing for each survey the number and dollar amount of transactions, and the per centages of the respective totals of each, attributable to each of the various transactions categories. (Also, because the CHIPS survey uniquely included transactions of four foreign bank CHIPS participants, the survey data for those participants alone are shown separately in Table 9 for comparison, but will not hereafter be referred to separately since their presence in the CHIPS survey does not materially affect the nature or composition of the overall results.)

The most striking, though perhaps not surprising, feature of Table 8 is the extent to which it demonstrates the substantial independence of business purposes served by the two funds transfer systems. At the one extreme, CHIPS handled almost all foreign exchange transactions, while at the other extreme Fedwire accounted for virtually all transactions related to securities purchase/ redemption/financing and Federal funds purchases and sales.

Table 8 does, of course, indicate seemingly significant overlap between the two wire systems in those transactions included within the four categories labeled Bank Loan, Commercial and Miscellaneous, Settlement, and Eurodollar Placements. Even here, however, the overlap is more apparent than real. Within these broad categories of transactions, there are substantial differences as to the location of the customers involved and the nature and purpose of the transactions, with CHIPS internationally specialized in both respects and Fedwire domestically focused. As one example, in the second largest apparent area of overlap--settlement transactions--

TABLE 8

TRANSACTIONS BY SURVEY CATEGORY BY WIRE SYSTEM
($ Amounts in Millions)

Schedule/ ansactions Category	CHIPS				Fedwire			
	No. of Trans-actions	%	Dollar Amount	%	No. of Trans-actions	%	Dollar Amount	%
Securities Purchase/ Redemption/ Financing	32	1.2	930	1.7	990	32.6	27,717	24.8
Bank Loan	44	1.6	1,001	1.8	79	2.6	2,340	2.1
Federal Funds	10	0.4	146	0.3	888	29.2	39,709	35.5
Commercial and Misc.	131	4.7	4,702	8.4	540	17.8	18,762	16.8
Settlement	130	4.7	7,140	12.8	228	7.5	11,735	10.5
Eurodollar Placements	659	23.7	18,259	33.0	289	9.5	11,200	10.0
Foreign Exchange	1,773	63.8	23,476	42.0	27	0.9	245	0.2
tals	2,779	100.0	55,652	100.0	3,041	100.0	111,708	100.0

TABLE 9

CHIPS TRANSACTIONS OF FOREIGN BANK PARTICIPANTS BY SURVEY CATEGORY
($ Amounts in Millions)

Schedule/ Transactions Category	Number of Transactions	%	Dollar Amount	%
A. Securities Purchase/ Redemption/ Financing	1	0.3	33	0.5
B. Bank Loan	1	0.3	2	--
C. Federal Funds	--	--	--	--
D. Commercial and Misc.	5	1.3	142	2.2
E. Settlement	6	1.5	117	1.8
F. Eurodollar Placements	93	23.3	2,830	44.3
F. Foreign Exchange	293	73.4	3,258	51.1
Totals	399	100.0	6,382	100.0

the CHIPS payments were dominated by adjustments to the correspondent balances of foreign banks and to settlement of Euroclear and Cedel positions. Fedwire settlement transactions, on the other hand, were dominated by adjustments to the correspondent balances of domestic banks and the settlement of end-of-day CHIPS positions on the books of the Federal Reserve Bank of New York. These sorts of differences between CHIPS and Fedwire will be seen throughout the following analysis.

The preceding Table 8 gives, of course, only a rough picture of the true division of labor between CHIPS and Fedwire. The differences in the size and structure of the two samples in relation to the respective overall CHIPS and Fedwire traffic of the survey participants, together with the differing survey response rates, makes a close comparison of the raw survey data inappropriate. To get a better picture, it is necessary to use the individual survey statistics to estimate the characteristics of the respective "populations" from which they were drawn. To accomplish that, the data shown in Table 8 were developed for each of the three payment size classifications used in drawing the samples, and the percentages so obtained were then multiplied against the respective CHIPS and Fedwire population totals within each of those three payment size classifications. The results were then added across the three payment size classifications to get an estimate of the breakdown of the aggregate CHIPS and Fedwire traffic from which the samples were drawn. The outcome of these estimation procedures is presented as Table 10.

TABLE 10

ESTIMATED AGGREGATE TRANSACTIONS BY WIRE SYSTEM
($ Amounts in Millions)

Schedule/ Transactions Category	CHIPS				Fedwire			
	No. of Trans-actions	%	Dollar Amount	%	No. of Trans-actions	%	Dollar Amount	%
A. Securities Purchase/ Redemption/ Financing	274	1.0	2,842	1.4	4,458	37.7	54,856	27.8
B. Bank Loan	399	1.4	3,476	1.7	272	2.3	3,956	2.0
C. Fed Funds	107	0.4	788	0.4	2,361	19.9	66,269	33.6
D. Commercial and Misc.	1,295	4.5	12,793	6.2	2,690	22.7	33,593	17.0
E. Settlement	945	3.3	16,198	7.9	915	7.7	18,664	9.5
F. Eurodollar Placements	4,800	16.8	56,255	27.5	966	8.2	18,848	9.6
F. Foreign Exchange	20,674	72.6	112,505	54.9	173	1.5	858	0.4
Totals	28,494	100.0	204,857	100.0	11,836	100.0	197,043	100.0

The principal differences between Table 8 and Table 10 center on the percentage composition of CHIPS payments traffic. Foreign Exchange transactions take on a significantly greater importance in both numbers and dollar amounts, because these transactions tend to have a relatively low average dollar value and thus received a relatively low weight in the graduated percentage sampling procedure that was used for the survey. For the opposite reason, Eurodollar Placement and Settlement transactions both assume lower percentages in the CHIPS estimated aggregate transactions data. Foreign Exchange and Eurodollar Placement transactions remain by far the dominant payment flows on CHIPS, together accounting for close to an estimated 90 percent of total transactions and for 82.4 percent of dollar value. In comparison to Fedwire, CHIPS also takes on a relatively greater role in Eurodollar placement activity, accounting for 75 percent of the total of such estimated aggregate payments by survey participants on both CHIPS and Fedwire, up from 62 percent of the total of Eurodollar Placements captured in the survey data.

The Survey Results in Detail

The remainder of this report presents for both the CHIPS and Fedwire surveys composite summaries of the survey reporting schedules that were returned by the survey participants, along with data on the timing of the transactions within the day. Also, for Fedwire, data are presented on the destination of the payments by Federal Reserve District. The foreign bank participants are included in the CHIPS data throughout. Also, no attempt is made to expand either the CHIPS or Fedwire data to estimate population characteristics.

Schedule A: Securities Purchase/Redemption/Financing Transactions

Tables 11 and 12, overleaf, present the composite summaries of the reporting forms (Schedule A) for this transactions category received back from the CHIPS and Fedwire surveys, respectively. The CHIPS survey results included only 32 transactions in this category, totaling $930 million in value. By contrast, the Fedwire survey results included 990 transactions with an aggregate value of $27,717 million. This category of transactions was both the second smallest for the CHIPS survey and the second highest for Fedwire, with Federal funds transactions in each case making for these opposing second-place rankings (see Table 8).

Transactions for Broker/Dealer and Investor Customer accounts dominated both surveys about equally. As to types of instruments, forty percent of the dollar value of CHIPS transactions were in Eurobonds/notes, while, in contrast, transactions on Fedwire were scattered rather broadly across the full array of domestic instruments and included only a relatively small percentage of Eurodollar instruments. Not surprisingly, commercial paper transactions dominated the Fedwire survey results, reflecting the fact that several of the participant banks in the survey are major issuing and paying agents for issuers of commercial paper. The 12.6 percent share of transactions involving "other" instruments reflected for the most part purchases of portfolios of whole home mortgages from thrift institution by a Federal mortgage agency, obviously for the purpose of securitization.

TABLE 11

CHIPS SECURITIES PURCHASE/REDEMPTION/FINANCING TRANSACTIONS
COMPOSITE SUMMARY
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Initiated By/For:				
Own Investment Account	--	--	--	--
Own Trading Account	--	--	--	--
Own Other Account	2	6.25	148	15.94
Broker/Dealer	14	43.75	454	48.85
Investor Customer	14	43.75	278	29.89
Security Issuer	2	6.25	50	5.32
Instrument:				
Bankers Acceptance	1	3.13	5	0.49
Book-Entry Securities --Fedwire	1	3.13	2	0.21
Domestic C/D	3	9.38	12	1.32
Euro C/D	2	6.25	16	1.73
Commercial Paper	6	18.75	162	17.46
Corporate Bond/Note	2	6.25	114	12.24
Corporate Stock	--	--	--	--
Eurobond/Note	9	28.13	363	38.99
Mortgage-Backed Security --Definitive	--	--	--	--
Municipal Security	--	--	--	--
Other	6	18.75	229	24.64
Misc. Pool of Loan Collateral	--	--	--	--
Unspecified	2	6.25	27	2.90

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TABLE 11
(Continued from previous page)

CHIPS SECURITIES PURCHASE/REDEMPTION/FINANCING TRANSACTIONS
COMPOSITE SUMMARY
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Nature of Transaction:				
New Issue	9	28.13	258	27.70
Secondary Market	16	50.00	588	63.24
Payment at Maturity	5	15.63	77	8.28
Unspecified	2	6.25	7	0.79
Purpose of Transaction:				
Investment	4	12.50	103	11.03
Trading	12	37.50	428	46.07
Underwriting	2	6.25	70	7.52
Repurchase Agreement	2	6.25	35	3.76
Collateralized Broker/Dealer Loan	2	6.25	100	10.75
Safekeeping	1	3.13	5	0.54
Other	2	6.25	123	13.26
Unspecified	7	21.88	66	7.06
TOTALS	32	100.0	930	100.0

TABLE 12

FEDWIRE SECURITIES PURCHASE/REDEMPTION/FINANCING TRANSACTIONS
COMPOSITE SUMMARY
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Initiated By/For:				
Own Investment Account	7	0.71	155	0.56
Own Trading Account	21	2.12	679	2.45
Own Other Account	34	3.43	1,011	3.65
Broker/Dealer	437	44.14	16,139	58.23
Investor Customer	359	36.26	6,615	23.87
Security Issuer	132	13.33	3,118	11.25
Instrument:				
Bankers Acceptance	86	8.69	1,031	3.72
Book-Entry Securities --Fedwire	62	6.26	3,788	13.66
Domestic C/D	79	7.98	2,321	8.38
Euro C/D	51	5.15	1,500	5.41
Commercial Paper	410	41.41	10,366	37.40
Corporate Bond/Note	33	3.33	1,090	3.93
Corporate Stock	3	0.30	23	0.08
Eurobond/Note	3	0.30	207	0.75
Mortgage-Backed Security --Definitive	49	4.95	1,046	3.77
Municipal Security	46	4.65	413	1.49
Other	93	9.39	3,489	12.59
Misc. Pool of Loan Collateral	9	0.91	256	0.92
Unspecified	66	6.67	2,188	7.89

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TABLE 12
(Continued from previous page)

FEDWIRE SECURITIES PURCHASE/REDEMPTION/FINANCING TRANSACTIONS
COMPOSITE SUMMARY
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Nature of Transaction:				
New Issue	285	28.79	7,429	26.80
Secondary Market	395	39.90	9,791	35.32
Payment at Maturity	244	24.65	7,373	26.60
Unspecified	66	6.67	3,124	11.27
Purpose of Transaction:				
Investment	273	27.58	5,843	21.08
Trading	235	23.74	6,347	22.90
Underwriting	11	1.11	501	1.81
Repurchase Agreement	189	19.09	8,227	29.68
Collateralized Broker/Dealer Loan	17	1.72	906	3.27
Safekeeping	86	8.69	1,204	4.34
Other	64	6.46	1,972	7.11
Unspecified	115	11.62	2,718	9.81
TOTALS	990	100.0	27,717	100.0

With respect to the Fedwire survey alone, the almost precise equality between the dollar value of new issue transactions and payments at maturity is a sensible result that is suggestive of good quality of survey information. The 30 percent figure for the share of transactions value attributed to repurchase agreements under the "Purpose of Transaction" heading seems a bit high, but is consistent with both the sizeable shares of transactions value attributed to Broker/Dealer customers and to Fedwire book-entry securities.

Tables 13 and 14 on the next two pages show securities related transactions by time of day for the CHIPS and Fedwire surveys, respectively. As expected, the payments cluster heavily toward the end of the day on both wire transfer systems. Almost 70 percent of the value of CHIPS securities-related transactions occurred in the 2 1/2 hour period between 2:00 p.m. and the close of CHIPS at 4:30 p.m. The end-of-day clustering of activity was equally compressed in time on Fedwire, with almost 60 percent of the value of securities-related transactions occurring in the two hours just prior to the normal 6:00 p.m. closing of Fedwire to third-party intra-District traffic. This heavy end-of-day clustering on Fedwire was due almost entirely to payments flows associated with new securities issuance. Nearly 80 percent of the day's total of $7.4 billion of payments attributed in the Fedwire survey to new securities issues occurred within this two-hour period, half of it involving commercial paper and the other half spread broadly across eight other classes of instruments.

TABLE 13

CHIPS SECURITIES PURCHASE/REDEMPTION/FINANCING TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
7:31 to 8:00	1	3.13	2	0.21
8:01 to 8:30	1	3.13	13	1.34
8:31 to 9:00	0	0.00	0	0.00
9:01 to 9:30	0	0.00	0	0.00
9:31 to 10:00	0	0.00	0	0.00
10:01 to 10:30	0	0.00	0	0.00
10:31 to 11:00	0	0.00	0	0.00
11:01 to 11:30	2	6.25	55	5.94
11:31 to 12:00	1	3.13	98	10.57
12:01 to 12:30	1	3.13	5	0.52
12:31 to 13:00	0	0.00	0	0.00
13:01 to 13:30	1	3.13	70	7.51
13:31 to 14:00	3	9.38	45	4.80
14:01 to 14:30	6	18.75	147	15.79
14:31 to 15:00	2	6.25	21	2.27
15:01 to 15:30	7	21.88	214	23.05
15:31 to 16:00	4	12.50	140	15.09
16:01 to 16:30	3	9.38	120	12.91
Totals	32	100.00	930	100.00

TABLE 14

FEDWIRE SECURITIES PURCHASE/REDEMPTION/FINANCING TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
8:31 to 9:00	3	0.30	115	0.41
9:01 to 9:30	0	0.00	0	0.00
9:31 to 10:00	15	1.52	193	0.70
10:01 to 10:30	7	0.71	408	1.47
10:31 to 11:00	6	0.61	780	2.82
11:01 to 11:30	19	1.92	335	1.21
11:31 to 12:00	7	0.71	761	2.74
12:01 to 12:30	26	2.63	453	1.63
12:31 to 13:00	17	1.72	567	2.05
13:01 to 13:30	29	2.93	1,898	6.85
13:31 to 14:00	58	5.86	1,398	5.05
14:01 to 14:30	70	7.07	1,581	5.70
14:31 to 15:00	87	8.79	2,050	7.40
15:01 to 15:30	8	0.81	198	0.71
15:31 to 16:00	20	2.02	362	1.31
16:01 to 16:30	192	19.39	4,447	16.04
16:31 to 17:00	201	20.30	4,243	15.31
17:01 to 17:30	199	20.10	7,018	25.32
17:31 to 18:00	18	1.82	638	2.30
18:01 to 18:30	8	0.81	271	0.98
Totals	990	100.00	27,717	100.00

With respect to Fedwire, the payments flows related to securities activities were heavily concentrated within the Second Federal Reserve District (see Table 15 on the next page). Seventy-six percent of the value of securities-related payments went to Second District counterparties, and 87 percent of that went from one of the nine Clearing House bank survey participants to another. The distribution of securities-related payments among the other Federal Reserve Districts is about as might have been expected, except for the low percentage accounted for by the Boston District. The latter, however, reflects the fact that the larger Boston banks either have offices in New York City that handle their securities-related transactions or use New York correspondent banks for that purpose.

TABLE 15

FEDWIRE SECURITIES PURCHASE/REDEMPTION/FINANCING TRANSACTIONS DESTINATION BY FEDERAL RESERVE DISTRICT
($ amounts in millions)

District	Number of Transactions	Percent	Dollar Amount	Percent
Boston	23	2.33	247.3	0.90
New York 1/	733	74.12	20,874.0	76.26
Philadelphia	17	1.72	330.5	1.21
Cleveland	27	2.73	867.3	3.17
Richmond	14	1.42	119.6	0.44
Atlanta	10	1.01	558.0	2.04
Chicago	71	7.18	1,099.1	4.02
St. Louis	5	0.51	32.0	0.12
Minneapolis	16	1.62	384.1	1.40
Kansas City	14	1.42	841.0	3.07
Dallas	10	1.01	357.4	1.31
San Francisco	49	4.95	1,661.4	6.07
Totals	989	100.00	27,371.6	100.00
1/Received by Survey Participants.	638	64.51	18,203.9	66.51

B. Bank Loan Transactions

Tables 16 and 17 present for CHIPS and Fedwire, respectively, the composite summaries of the survey responses covering Bank Loan transactions. As expected, these transactions were small in frequency and value within both samples. Many bank loan transactions--disbursement of principal and repayments--probably occur directly across the books of lending banks, rather than flowing through the wire transfer networks. One exception to that would be where a bank's customers are making repayments on loans from third-party lenders, that is, where a bank's customer instructs its bank to transfer funds to repay a loan at another bank. These payments are made either directly or through a lead bank and probably explain the fact that payments of this nature constitute the largest single category in both CHIPS and the Fedwire survey. In any event the small numbers and amounts of Bank Loans transactions in both surveys, together with the fact that any one day's activity of this type is apt to reflect unique influences, makes broad generalizations about this survey category inappropriate

Tables 18, and 19 show, respectively the intraday timing of CHIPS and Fedwire Bank Loan transactions, and Table 20 presents the destination of the Fedwire payments. Nothing in these data appears surprising. The timing data show both CHIPS and Fedwire payments fairly well distributed throughout the day. The Fedwire destination data do show a higher concentration of loan-related payments to the Chicago and San Francisco Districts than is true of the other survey transactions categories, but that could be nothing more than mere

happenstance, given the small number of loan transactions captured in the survey and the timing factors that can impact any one day's payments patterns for this classification of transactions.

TABLE 16

CHIPS BANK LOAN TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

Nature of Transaction	Number of Transactions	Percent	Dollar Amount	Percent
Disbursement of Principal to Borrower	13	29.55	141	14.09
Purchase of Loan Participation	--	--	--	--
Customer Drawdown on Loan Facility	7	15.91	112	11.23
Customer Payment on Third-Party Loan	4	9.09	53	5.28
Payment to Lead/Agent Bank	--	--	--	--
Disbursement of Loan Payments Received	20	45.45	694	69.39
Totals	44	100.00	1,001	100.00

TABLE 17

FEDWIRE BANK LOAN TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

Nature of Transaction	Number of Transactions	Percent	Dollar Amount	Percent
Disbursement of Principal to Borrower	20	25.32	503	21.51
Purchase of Loan Participation	1	1.27	8	0.32
Customer Drawdown on Loan Facility	10	12.66	102	4.35
Customer Payment on Third-Party Loan	25	31.65	1,151	49.18
Payment to Lead/Agent Bank	--	--	--	--
Disbursement of Loan Payments Received	22	27.85	530	22.63
Not Categorized	1	1.27	47	2.00
Totals	79	100.00	2,340	100.00

TABLE 18

CHIPS BANK LOAN TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
7:31 to 8:00	4	9.09	317	31.66
8:01 to 8:30	1	2.27	2	0.20
8:31 to 9:00	0	0.00	0	0.00
9:01 to 9:30	1	2.27	2	0.22
9:31 to 10:00	0	0.00	0	0.00
10:01 to 10:30	0	0.00	0	0.00
10:31 to 11:00	3	6.82	20	2.03
11:01 to 11:30	4	9.09	100	9.99
11:31 to 12:00	0	0.00	0	0.00
12:01 to 12:30	2	4.55	95	9.49
12:31 to 13:00	1	2.27	8	0.75
13:01 to 13:30	6	13.64	102	10.14
13:31 to 14:00	4	9.09	59	5.93
14:01 to 14:30	5	11.36	142	14.19
14:31 to 15:00	6	13.64	36	3.59
15:01 to 15:30	1	2.27	15	1.50
15:31 to 16:00	1	2.27	2	0.23
16:01 to 16:30	5	11.36	101	10.08
Totals	44	100.00	1,001	100.00

TABLE 19

FEDWIRE BANK LOAN TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
9:01 to 9:30	2	2.53	55	2.35
9:31 to 10:00	0	0.00	0	0.00
10:01 to 10:30	2	2.53	71	3.04
10:31 to 11:00	3	3.80	150	6.41
11:01 to 11:30	3	3.80	175	7.49
11:31 to 12:00	0	0.00	0	0.00
12:01 to 12:30	4	5.06	217	9.26
12:31 to 13:00	6	7.59	176	7.51
13:01 to 13:30	4	5.06	253	10.81
13:31 to 14:00	1	1.27	10	0.43
14:01 to 14:30	10	12.66	197	8.42
14:31 to 15:00	6	7.59	182	7.76
15:01 to 15:30	0	0.00	0	0.00
15:31 to 16:00	0	0.00	0	0.00
16:01 to 16:30	16	20.25	344	14.68
16:31 to 17:00	11	13.92	316	13.51
17:01 to 17:30	9	11.39	189	8.06
17:31 to 18:00	2	2.53	6	0.26
Totals	79	100.00	2,340	100.00

TABLE 20

FEDWIRE BANK LOAN TRANSACTIONS
DESTINATION BY FEDERAL RESERVE DISTRICT
($ amounts in millions)

District	Number of Transactions	Percent	Dollar Amount	Percent
Boston	1	1.27	1.5	0.06
New York 1/	44	55.70	1,442.2	61.63
Philadelphia	0	0.00	0.0	0.00
Cleveland	4	5.06	30.5	1.30
Richmond	1	1.27	10.0	0.43
Atlanta	2	2.53	21.2	0.91
Chicago	16	20.25	431.6	18.44
St. Louis	0	0.00	00.0	0.00
Minneapolis	1	1.27	40.0	1.71
Kansas City	2	2.53	11.7	0.50
Dallas	2	2.53	12.3	0.53
San Francisco	6	7.59	339.0	14.49
Totals	79	100.00	2,340.1	100.00
1/Received by Survey Participants.	33	41.77	1,171.5	50.06

C. Federal Funds Transactions

The survey statistics for this class of transactions appear consecutively as Tables 21 through 25, beginning at page 37.

CHIPS transactions in this category, shown in Table 21, were de minimus in both numbers and value, as mentioned earlier. All of the 10 reported CHIPS transactions were undertaken by Clearing House banks for the accounts of their foreign bank customers, only one of which maintains an account with the Federal Reserve Bank of New York. Moreover, the one small CHIPS transaction categorized as term Federal funds appears in fact to have been a Eurodollar placement instead. Thus, it seems that CHIPS serves as a mechanism for effecting Federal funds transfers only in extremely limited circumstances involving an inability to access Fedwire directly or conveniently.

The Fedwire transactions in Federal funds described in Table 22 reflect the fact that the nine Clearing House banks participating in the Fedwire survey are all very active in the Federal funds market as net borrowers. This shows up in the result that more than 60 percent of transactions by numbers and value are identified as for the own accounts of the survey banks. And, because the survey was limited to payments sent by the survey banks, these transactions for "own account" appear largely as "return" transactions. Indeed, of the $25,559 million of transactions for the own accounts of the survey participants, $21,091 millior were returns of funds borrowed and only $4,468 million (17.5 percent) were sales. The corresponding breakdown of the total of $14,150 million of transactions for customer accounts was $10,007 million in

Federal funds returns and $4,065 million in sales. This latter breakdown suggests that customer depository institutions of the nine Clearing House banks are also fairly heavy net purchasers of Federal funds in the aggregate as well.

Of the 15 Federal funds transactions on Fedwire identified in Table 22 as "term", only four actually provided the maturity, which ranged from three to 309 days. Thus, these data do not permit any generalization about term Federal funds transactions beyond the obvious conclusion that they are indeed rare. However, it should be noted that since this is a study of payments flows, it understates the amount of outstanding term Federal funds in direct proportion to the average maturity of such term borrowing. For example, if the true average maturity of term Federal funds were ten business days, only one-tenth on average would be paid-off or re-borrowed each day. For that reason, nothing in the Fedwire survey data shown in Table 22 necessarily contradicts the 1977 study by the Staff of the Board of Governors that found about 7 1/4 percent of outstanding Federal funds borrowings to involve term contracts.[1/] By the same token, the tiny percentage of transactions value attributed in this survey to continuing Federal funds contracts cannot be said to be at significant variance from the 4 percent figure the 1977 Staff study cited for such amounts outstanding.

1/ See "Repurchase Agreements and Federal Funds", 64 Federal Reserve Bulletin (May, 1978) p. 359.

Tables 23 and 24 show the time-of-day profiles of Federal funds transactions on Fedwire, broken down by sales of funds and return of funds borrowed. The corresponding data for CHIPS have been omitted since it is entirely meaningless, given the insignificance of Federal funds traffic on the CHIPS system.

The intraday profiles of Federal funds sales and returns on Fedwire follow the classic pattern, with returns strongly concentrated in the first half of the day and sales bunched late in the day. This is particularly evident when the percent figures in Tables 23 and 24 are summed to obtain the cumulative percentages of dollar value sent by time of day. Thus, as shown in Table 25, more than three-fourths by value of all Federal funds returns had occurred by 2:00 p.m., with over 50% of these returns occurring by 1:00 p.m., while little more than 5 percent of Federal funds sales had been made by that same time. Moreover, by 4:00 p.m. more than 80 percent of all Federal funds sales still remained to be effected, suggesting that these sales (and purchase) transactions may largely reflect adjustments to funds excesses and deficiencies that became known only late in the day, rather than established ongoing lending and borrowing relationships between regular counterparties.

Table 26 shows the destination of Fedwire Federal Funds transactions by Federal Reserve District. The broad, nationwide distribution of the payments reflects the widely dispersed sources from which the participant Clearing House bank purchase (and hence repay) Federal funds. Of particular note, however, is the heavy flow of transactions to the Kansas City Federal Reserve District. That flow largely reflects the presence in that District of the United States Credit Union Central, which is an extremely large seller of Federal Funds to several of the Clearing House banks.

TABLE 21

CHIPS FEDERAL FUNDS TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Transaction for:				
Own Account	--	--	--	--
Customer	10	100.00	146	100.00
Nature of Transaction:				
Sale	6	60.00	131	89.76
Return	4	40.00	15	10.24
Original Maturity:				
Overnight	9	90.00	141	96.56
Continuing Contract	--	--	--	--
Term	1	10.00	5	3.44
TOTALS	10	100.00	146	100.00

TABLE 22

FEDWIRE FEDERAL FUNDS TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Transaction for:				
Own Account	549	61.82	25,559	64.37
Customer	339	38.18	14,150	35.63
Nature of Transaction:				
Sale	172	19.37	8,533	21.49
Return	712	80.18	31,098	78.31
Unspecified	4	0.45	78	0.20
Original Maturity:				
Overnight	851	95.83	38,266	96.37
Continuing Contract	3	0.34	178	0.45
Term	15	1.69	741	1.87
Unspecified	19	2.14	524	1.32
TOTALS	888	100.00	39,709	100.00

TABLE 23

FEDWIRE SALE OF FEDERAL FUNDS TRANSACTIONS BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
8:31 to 9:00	1	0.58	82	0.96
9:01 to 9:30	0	0.00	0	0.00
9:31 to 10:00	2	1.16	17	0.20
10:01 to 10:30	0	0.00	0	0.00
10:31 to 11:00	0	0.00	0	0.00
11:01 to 11:30	2	1.16	26	0.30
11:31 to 12:00	0	0.00	0	0.00
12:01 to 12:30	2	1.16	29	0.34
12:31 to 13:00	5	2.91	44	0.52
13:01 to 13:30	5	2.91	67	0.78
13:31 to 14:00	4	2.33	195	2.29
14:01 to 14:30	10	5.81	373	4.37
14:31 to 15:00	13	7.56	396	4.64
15:01 to 15:30	0	0.00	0	0.00
15:31 to 16:00	4	2.33	320	3.75
16:01 to 16:30	43	25.00	2,405	28.18
16:31 to 17:00	15	8.72	783	9.18
17:01 to 17:30	17	9.88	822	9.64
17:31 to 18:00	21	12.21	878	10.29
18:01 to 18:30	13	7.56	845	9.91
18:31 to 19:00	15	8.72	1,250	14.65
Totals	172	100.00	8,533	100.00

TABLE 24

FEDWIRE RETURN OF FEDERAL FUNDS TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
8:31 to 9:00	43	6.04	3,397	10.92
9:01 to 9:30	0	0.00	0	0.00
9:31 to 10:00	34	4.78	1,503	4.83
10:01 to 10:30	11	1.54	792	2.55
10:31 to 11:00	45	6.32	2,755	8.86
11:01 to 11:30	117	16.43	3,050	9.81
11:31 to 12:00	52	7.30	1,046	3.36
12:01 to 12:30	54	7.58	2,013	6.47
12:31 to 13:00	62	8.71	2,528	8.13
13:01 to 13:30	83	11.66	3,283	10.56
13:31 to 14:00	57	8.01	3,349	10.77
14:01 to 14:30	36	5.06	1,576	5.07
14:31 to 15:00	34	4.78	1,735	5.58
15:01 to 15:30	1	0.14	50	0.16
15:31 to 16:00	0	0.00	0	0.00
16:01 to 16:30	37	5.20	2,483	7.98
16:31 to 17:00	30	4.21	929	2.99
17:01 to 17:30	12	1.69	485	1.56
17:31 to 18:00	4	0.56	126	0.40
Totals	712	100.00	31,098	100.00

TABLE 25

FEDWIRE FEDERAL FUNDS TRANSACTIONS
Cumulative Percentage of Dollar Value Sent by Time of Day

Time	Sales	Returns
8:30	0.00%	0.00%
9:00	0.96	10.92
9:30	0.96	10.92
10:00	1.16	15.75
10:30	1.16	18.30
11:00	1.16	27.16
11:30	1.46	36.97
12:00	1.46	40.33
12:30	1.80	46.80
1:00	2.32	54.93
1:30	3.10	65.49
2:00	5.39	76.26
2:30	9.76	81.33
3:00	14.40	86.91
3:30	14.40	87.07
4:00	18.15	87.07
4:30	46.33	95.05
5:00	55.51	98.04
5:30	65.15	99.60
6:00	75.44	100.00%
6:30	85.35	
7:00	100.00%	

TABLE 26

FEDWIRE FEDERAL FUNDS TRANSACTIONS
DESTINATION BY FEDERAL RESERVE DISTRICT
($ amounts in millions)

District	Number of Transactions	Percent	Dollar Amount	Percent
Boston	25	2.82	800.7	2.02
New York 1/	386	43.47	19,435.4	48.94
Philadelphia	22	2.48	605.4	1.52
Cleveland	29	3.27	1,105.2	2.78
Richmond	27	3.04	716.0	1.80
Atlanta	70	7.88	3,515.7	8.85
Chicago	62	6.98	2,089.3	5.26
St. Louis	29	3.27	668.2	1.68
Minneapolis	18	2.03	871.9	2.20
Kansas City	82	9.23	4,797.7	12.08
Dallas	25	2.82	1,166.1	2.94
San Francisco	113	12.73	3,937.8	9.92
Totals	888	100.00	39,709.4	100.00
1/Received by Survey Participants.	237	26.69	9,938.2	25.03

D. Commercial and Miscellaneous Transactions

The five statistical tables covering this category of survey transactions are presented consecutively beginning with Table 27 on page 45.

Because this survey reporting category included corporate cash concentration and dispersion transactions, it is not surprising that those transactions dominate both surveys. Table 27, which summarizes the CHIPS survey reporting schedules, shows that 80 percent by value of all such transactions involved cash concentration or dispersion by commercial customers. For Fedwire (Table 28), such transactions accounted for an even larger share--93 percent. In both survey's, cash disbursements transactions (the downstreaming of funds), far exceeded those transactions associated with cash concentrations (the upstreaming of funds), undoudtedly reflecting the role of the survey participants as concentration banks.

Transactions involving purchases of goods or services were, as expected, small in number and small in value on both wires. Because most payments for goods and services do tend to be small in value, the fact that transactions of under $1 million were excluded from both samples undoubtedly accounts for their small numerical presence in the two surveys.

Almost all Commercial and Miscellaneous transactions captured in both surveys were for customer accounts; most of those few identified as for the own accounts of the survey participants were, unsurprisingly, associated with returns of erroneous transfers or other corrections of error. Those transactions falling within the "other" survey category involved a wide array of purposes, the most frequent of which was payment for purchases of precious metals.

The time-of-day profiles of payments, shown in Table 29 and 30 for the CHIPS and Fedwire surveys, respectively, indicate that most Commercial and Miscellaneous transactions on both wires fall in the latter half of the day. This, of course, is consistent with the dominance within this survey category of cash concentration/ dispersion transactions. Worth noting, though, is the mid day buldge in CHIPS that corresponds with the close of the European business day.

The Fedwire destination data, presented in Table 31, indicates that almost 74 percent by value of Commercial and Miscellaneous payments remained within the Second Federal Reserve District and that 94 percent of that (69 percent of the grand total of such Fedwire payments) flowed between the nine survey participants. Thus, much of the cash concentration/dispersion activity that dominates this Fedwire transactions category simply reflects the repositioning of balances during the day among multiple accounts held at the nine clearing house banks by large commercial customers, especially those held by large nondepository financial institutions.

TABLE 27

CHIPS COMMERCIAL AND MISCELLANEOUS TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Transaction for:				
Own Account	7	5.34	2840	6.05
Customer	124	94.66	4,417	93.95
Nature of Transaction:				
Purchase of Goods or Services	15	11.45	298	6.33
Cash Concentration in a Lead Account from Other Accounts of the Same Organization	19	14.50	1,432	30.46
Cash Dispersion from a Lead Account to Other Accounts of the Same Organization	54	41.22	2,345	49.89
Domestic Time Deposit Placement or Return	12	9.16	200	4.25
Return of Erroneous Transfer or Other Correction of Error	10	7.63	136	2.89
Other	20	15.27	286	6.07
Unspecified	1	0.76	5	0.11
TOTALS	131	100.00	4,702	100.00

TABLE 28

FEDWIRE COMMERCIAL AND MISCELLANEOUS TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Transaction for:				
Own Account	21	3.89	252	1.34
Customer	518	95.93	18,430	98.23
Unspecified	1	0.19	80	0.43
Nature of Transaction:				
Purchase of Goods or Services	23	4.26	126	0.67
Cash Concentration in a Lead Account from Other Accounts of the Same Organization	128	23.70	4,754	25.34
Cash Dispersion from a Lead Account to Other Accounts of the Same Organization	316	58.52	12,619	67.26
Domestic Time Deposit Placement or Return	15	2.78	165	0.88
Return of Erroneous Transfer or Other Correction of Error	15	2.78	399	2.13
Other	42	7.78	684	3.64
Unspecified	1	0.19	14	0.07
TOTALS	540	100.00	18,762	100.00

TABLE 29

CHIPS COMMERCIAL AND MISCELLANEOUS TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
7:31 to 8:00	2	1.53	192	4.09
8:01 to 8:30	0	0.00	0	0.00
8:31 to 9:00	1	0.76	2	0.03
9:01 to 9:30	2	1.53	4	0.09
9:31 to 10:00	1	0.76	1	0.03
10:01 to 10:30	2	1.53	230	4.89
10:31 to 11:00	6	4.58	52	1.11
11:01 to 11:30	11	8.40	176	3.75
11:31 to 12:00	10	7.63	435	9.26
12:01 to 12:30	11	8.40	1,044	22.20
12:31 to 13:00	2	1.53	36	0.77
13:01 to 13:30	2	1.53	130	2.77
13:31 to 14:00	13	9.92	170	3.62
14:01 to 14:30	17	12.98	205	4.37
14:31 to 15:00	10	7.63	620	13.19
15:01 to 15:30	14	10.69	329	7.00
15:31 to 16:00	20	15.27	998	21.23
16:01 to 16:30	7	5.34	75	1.60
Totals	131	100.00	4,702	100.00

TABLE 30

FEDWIRE COMMERCIAL AND MISCELLANEOUS TRANSACTIONS BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
8:31 to 9:00	1	0.19	5	0.03
9:01 to 9:30	6	1.11	82	0.44
9:31 to 10:00	4	0.74	70	0.37
10:01 to 10:30	12	2.22	590	3.14
10:31 to 11:00	14	2.59	377	2.01
11:01 to 11:30	37	6.85	1,601	8.53
11:31 to 12:00	16	2.96	206	1.10
12:01 to 12:30	24	4.44	250	1.33
12:31 to 13:00	27	5.00	703	3.75
13:01 to 13:30	30	5.56	316	1.68
13:31 to 14:00	26	4.81	1,039	5.54
14:01 to 14:30	30	5.56	472	2.52
14:31 to 15:00	48	8.89	1,833	9.77
15:01 to 15:30	0	0.00	0	0.00
15:31 to 16:00	6	1.11	89	0.47
16:01 to 16:30	86	15.93	4,005	21.35
16:31 to 17:00	78	14.44	3,320	17.70
17:01 to 17:30	62	11.48	2,694	14.36
17:31 to 18:00	24	4.44	547	2.91
18:01 to 18:30	9	1.67	562	3.00
Totals	540	100.00	18,762	100.00

TABLE 31

FEDWIRE COMMERCIAL AND MISCELLANEOUS TRANSACTIONS
DESTINATION BY FEDERAL RESERVE DISTRICT
($ amounts in millions)

District	Number of Transactions	Percent	Dollar Amount	Percent
Boston	26	4.81	1,232.4	6.57
New York 1/	310	57.41	13,810.4	73.61
Philadelphia	27	5.00	265.7	1.42
Cleveland	21	3.89	363.0	1.94
Richmond	22	4.07	281.1	1.50
Atlanta	14	2.59	166.3	0.89
Chicago	46	8.52	1,625.4	8.66
St. Louis	7	1.30	27.8	0.15
Minneapolis	13	2.41	204.4	1.09
Kansas City	8	1.48	86.2	0.46
Dallas	11	2.04	82.9	0.44
San Francisco	35	6.48	616.2	3.28
Totals	540	100.00	18,761.8	100.00
1/Received by Survey Participants.	267	49.44	12,928.2	68.91

E. Settlement Transactions

The Tables containing the survey statistics for this group of transactions are numbered 32 through 36 and begin at page 52.

The composite summary of the CHIPS survey reporting schedules, shown in Table 32, contains no surprises. Correspondent balance adjustments account for more than 84 percent by value of all such reported CHIPS transactions, reflecting adjustments mostly by foreign banks to their correspondent balances held with the nine Clearing House banks. One minor apparent anomaly in the CHIPS data is the larger dollar amount of transactions attributed to settlement of CEDEL positions than to Euroclear positions, given the larger size of Euroclear, but that is partly offset by the presence of some Euroclear settlement transactions in the Fedwire data. However, the higher dollar value associated with CEDEL is not necessarily a reflection of the level of volume for either system, as both CEDEL and Euroclear are net settlers. Moreover, the roughly equal number of transactions picked up for each system indicates that parties deal with both systems.

With respect to the Fedwire data (see Table 33), correspondent balance adjustments dominate this group of transactions as well. While the share of total transactions by value is only 61 percent, versus 84 percent for CHIPS, that simply reflects the presence in the Fedwire statistics of large payments into the Federal Reserve Bank of New York to settle CHIPS positions. After excluding the latter from the transaction totals, correspondent balance adjustments account for 87 percent of the remaining Fedwire settlement transactions.

The pattern of payments by time of day, shown in Tables 34 and 35, reflects the fact that, by their nature, settlement transactions occur later in the day. The particularly heavy concentration of Fedwire settlement transactions between 5:00 and 5:30 p.m., for instance, simply reflects that fact that payments into the CHIPS settlement account occurred within that time frame.

An anomoly in the Fedwire Destination statistic shown in Table 36 is also largely explained by the CHIPS settlement account. While more than 65 percent of Fedwire settlement dollars went to Second District receivers, only 31 percent of that flowed between the Clearing House bank survey participants. That results from the fact that the survey picked up payments sent to the CHIPS settlement account, but, of course, not payments received by survey participant from the account, (a net, net number) and payments sent to correspondents for whom they settle on CHIPS (a net number).

TABLE 32

CHIPS SETTLEMENT TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Transaction for:				
Own Account	1	0.77	80	1.12
Customer	129	99.23	7,059	98.88
Purpose of Transaction:				
CHIPS Position	11	8.46	224	3.14
Depository Trust Company Position	--	--	--	--
MBSCC Position	--	--	--	--
Euroclear Position	14	10.77	160	2.25
Cedel Position	15	11.54	549	7.69
Check Clearings	--	--	--	--
Correspondent Balance Adjustment	87	66.92	6,015	84.25
ACH Position	--	--	--	--
Other	3	2.31	191	2.68
TOTALS	130	100.00	7,140	100.00

TABLE 33

FEDWIRE SETTLEMENT TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Transaction for:				
Own Account	16	7.02	3,099	26.41
Customer	212	92.98	8,636	73.59
Purpose of Transaction:				
CHIPS Position	12	5.26	3,573	30.45
Depository Trust Company Position	--	--	--	--
MBSCC Position	--	--	--	--
Euroclear Position	4	1.75	295	2.52
Cedel Position	--	--	--	--
Check Clearings	5	2.19	348	2.97
Correspondent Balance Adjustment	184	80.70	7,165	61.06
ACH Position	--	--	--	--
Other	22	9.65	303	2.58
Unspecified	1	0.44	50	0.43
TOTALS	228	100.00	11,735	100.00

TABLE 34

CHIPS SETTLEMENT TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
7:00 to 7:30	3	2.31	40	0.56
7:31 to 8:00	6	4.62	122	1.71
8:01 to 8:30	10	7.69	154	2.16
8:31 to 9:00	8	6.15	838	11.73
9:01 to 9:30	1	0.77	29	0.41
9:31 to 10:00	0	0.00	0	0.00
10:01 to 10:30	7	5.38	140	1.96
10:31 to 11:00	4	3.08	37	0.52
11:01 to 11:30	8	6.15	35	0.49
11:31 to 12:00	3	2.31	45	0.63
12:01 to 12:30	7	5.38	100	1.39
12:31 to 13:00	6	4.62	914	12.80
13:01 to 13:30	7	5.38	1,046	14.65
13:31 to 14:00	14	10.77	670	9.38
14:01 to 14:30	12	9.23	229	3.21
14:31 to 15:00	18	13.85	1,586	22.22
15:01 to 15:30	5	3.85	280	3.93
15:31 to 16:00	8	6.15	782	10.95
16:01 to 16:30	3	2.31	92	1.28
Totals	130	100.00	7,140	100.00

TABLE 35

FEDWIRE SETTLEMENT TRANSACTIONS BY TIME OF DAY ($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
8:31 to 9:00	2	0.88	269	2.29
9:01 to 9:30	1	0.44	70	0.60
9:31 to 10:00	5	2.19	419	3.57
10:01 to 10:30	5	2.19	126	1.08
10:31 to 11:00	1	0.44	10	0.09
11:01 to 11:30	12	5.26	788	6.71
11:31 to 12:00	4	1.75	56	0.48
12:01 to 12:30	7	3.07	362	3.08
12:31 to 13:00	9	3.95	301	2.57
13:01 to 13:30	7	3.07	184	1.57
13:31 to 14:00	11	4.82	102	0.87
14:01 to 14:30	13	5.70	357	3.04
14:31 to 15:00	16	7.02	318	2.71
15:01 to 15:30	3	1.32	328	2.80
15:31 to 16:00	4	1.75	504	4.30
16:01 to 16:30	36	15.79	1,197	10.20
16:31 to 17:00	29	12.72	1,125	9.59
17:01 to 17:30	37	16.23	4,129	35.19
17:31 to 18:00	12	5.26	430	3.67
18:01 to 18:30	12	5.26	647	5.51
18:31 to 19:00	2	0.88	11	0.09
Totals	228	100.00	11,735	100.00

TABLE 36

FEDWIRE SETTLEMENT TRANSACTIONS
DESTINATION BY FEDERAL RESERVE DISTRICT
($ amounts in millions)

District	Number of Transactions	Percent	Dollar Amount	Percent
Boston	10	4.39	246.8	2.10
New York 1/	98	42.98	7,674.3	65.40
Philadelphia	14	6.14	660.8	5.63
Cleveland	15	6.58	832.9	7.10
Richmond	11	4.82	119.7	1.02
Atlanta	11	4.82	171.8	1.46
Chicago	19	8.33	941.0	8.02
St. Louis	6	2.63	64.7	0.55
Minneapolis	4	1.75	31.9	0.27
Kansas City	4	1.75	50.8	0.43
Dallas	9	3.95	164.8	1.40
San Francisco	27	11.84	775.4	6.61
Totals	228	100.00	11,734.7	100.00
1/Received by Survey Participants.	35	15.35	2,375.8	20.24

Schedule F: Eurodollar Placements/Returns

Tables 37 through 43, beginning consecutively at page 61, summarize the survey data for this class of transactions.

The composite summaries of the survey reporting forms shown first in Tables 37 and 38 give further indication of the significan differences in the customer constituencies of CHIPS and Fedwire. As shown in tables 37 and 38, fully 90 percent by value of all CHIPS Eurodollar placement transactions were undertaken for the accounts of foreign customers, and foreign offices of the bank whereas only 26 percent of Fedwire transactions were for foreign customers. In this regard, it should be noted that the reporting schedule for these transactions instructed the survey participants to "treat foreign offices of all banks (including your own) as being 'foreign customers', and treat U.S. offices of foreign banks as being 'domestic customers'." Thus, a survey participant initiating a Eurodollar transaction (either a placement or a return) on behalf of its own, or anyone else's, foreign office would treat that as a transaction for a "foreign" customer. Similarly, any transaction initiated for the account of a U.S. office of a foreign bank would appear as a transaction for a domestic customer. The survey instruction was framed in this fashion so as to identify the decision centers from which the payment instructions originated.

CHIPS Eurodollar transactions were also more heavily for the account of foreign customers and the bank's overseas branches than were Fedwire transactions--94 percent versus 76 percent. That difference also stems from the domestic orientation of the Fedwire transactions; most of the 21 percent by value of Fedwire

transactions that were for the accounts of others than banks--i.e., for nonbank financial and nonfinancial customers--involved domestically based organizations.

The percentage of Eurodollar placements/returns by maturity for the one day category was, as shown in Tables 37 and 38, essentially the same for CHIPS and Fedwire. Also, the maturity distribution for the greater than one-day placements was broadly similar, with three-fourths of all term transactions on both wires having maturity of from two to thirty days. The average maturity of CHIPS term Eurodollar placement was, however, longer than the average maturity on Fedwire--41 days versus 27 days-- reflecting the fact that the CHIPS data contained a few very long maturity placements.

The division of Eurodollar transactions between original placements and repayments is noticeably different between the two surveys. In the case of CHIPS, the dollar value of the original placements dominate moderately with 56 percent of total transactions value, whereas in the Fedwire survey return transactions dominate strongly with 70 percent of total transactions value. Apparently, this again reflects, particularly in the case of the Fedwire data, the fact that the survey was limited to payments sent by the survey participants. Many Fedwire Eurodollar placements being made by domestic customers probably involve an incoming Fedwire payment, and may then involve either a transaction across the books of the receiving Clearing House bank, an outgoing CHIPS payment or an outgoing Fedwire payment. Either of the first two possibilities would diminish the presence of original placements (but not returns)

in the Fedwire survey, and the second of the two could account for the somewhat greater amount of original placements than returns in the CHIPS data as well.

The categorizations in Tables 37 and 38 of the "purpose" of Eurodollar transactions include some doubtful entries. Most survey participants, however, correctly categorized original Eurodollar placements as "investment" transactions and return transactions as the unwinding of "funding" transactions. The other categories that were occasionally designated were intended to apply primarily to the foreign exchange transactions which reporting Schedule F was also designed to capture.

Table 39 and 40 present the time-of-day pattern of all Eurodollar transactions on CHIPS and Fedwire, respectively. The majority of such transactions occurred in the latter half of the day on both wires. However, a more interesting breakdown is that shown in the next two Tables--41 and 42--which divide Eurodollar transactions between placement and returns and present the cumulative percentages of each sent by time of day. Interestingly, these data for CHIPS, while showing that CHIPS Eurodollar returns do occur earlier in the day than new placements, indicate only a relatively small timing disparity between the two payments flows. By contrast, the cumulative percentages shown for Fedwire indicate a wide disparity between returns and placements, approaching that between Federal Funds returns and sales discussed earlier. For instance, at 2:00 p.m. 60 percent by value of all the day's Eurodollar returns on Fedwire had been coupled, while only 15 percent of placement had been effected.

The closer timing match between Eurodollar placements and returns on CHIPS than on Fedwire may reflect the fact that CHIPS Eurodollar transactions are primarily for foreign customers in earlier time zones than those applicable to the domestic customers that predominate on Fedwire. However, that conclusion is problematical since the better match between placements and returns on CHIPS, as compared to Fedwire, lies more in the relatively earlier timing of CHIPS Eurodollar placements, while the intra-day timing of returns is much the same for the two wires after taking account of their different opening and closing times.

The Fedwire destination statistics by Federal Reserve District, shown in Table 43, indicate an unusually high percentage of payments going to the Boston District. That reflects the return of Eurodollar placements to several large money market mutual funds headquartered in Boston. Also, the sizable flow of payments to the Kansas City District in large part reflects returns of placements to the United Sates Credit Union Central located in that district.

TABLE 37

CHIPS EURODOLLAR TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Origination:				
In U.S. for own account	6	0.91	91	0.50
In U.S. for Domestic Customer	66	10.02	1,644	9.00
Outside U.S.	587	89.07	16,524	90.50
Customer Type:				
Bank	614	93.17	17,183	94.11
Nonbank Financial	34	5.16	857	4.69
Nonfinancial	9	1.37	203	1.11
Unspecified	2	0.30	17	0.09
Maturity:				
One Day	476	72.23	13,615	74.56
Greater than One Day	108	16.39	2,471	13.53
Unspecified	75	11.38	2,174	11.91
Nature of Transaction:				
Original Placement	379	57.51	10,301	56.41
Repayment	280	42.49	7,959	43.59
Purpose:				
Trade	44	6.68	1,239	6.78
Investment	310	47.04	8,378	45.88
Trading/Positioning	68	10.32	2,060	11.28
Funding	152	23.07	4,673	25.59
Other	7	1.06	129	0.71
Unspecified	78	11.84	1,781	9.75
TOTALS	659	100.00	18,259	100.00

TABLE 38

FEDWIRE EURODOLLAR TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Origination:				
In U.S. for own account	8	2.77	350	3.12
In U.S. for Domestic Customer	218	75.43	7,942	70.91
Outside U.S.	63	21.80	2,908	25.96
Customer Type:				
Bank	202	69.90	8,490	75.80
Nonbank Financial	23	7.96	1,145	10.22
Nonfinancial	58	20.07	1,247	11.13
Unspecified	6	2.80	319	2.85
Maturity:				
One Day	201	69.55	8,412	75.10
Greater than One Day	30	10.38	1,196	10.67
Unspecified	58	20.07	1,593	14.22
Nature of Transaction:				
Original Placement	124	42.91	3,321	29.65
Repayment	165	57.09	7,880	70.35
Purpose:				
Trade	11	3.81	161	1.44
Investment	113	39.10	3,872	34.57
Trading/Positioning	4	1.38	190	1.69
Funding	115	39.79	5,665	50.58
Other	4	1.38	61	0.54
Unspecified	42	14.53	1,252	11.17
TOTALS	289	100.00	11,200	100.00

TABLE 39

CHIPS EURODOLLAR TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
7:01 to 7:30	5	0.76	9	0.05
7:31 to 8:00	20	3.03	591	3.22
8:01 to 8:30	29	4.39	582	3.17
8:31 to 9:00	29	4.39	227	1.24
9:01 to 9:30	20	3.03	554	3.02
9:31 to 10:00	16	2.42	430	2.34
10:01 to 10:30	21	3.18	369	2.01
10:31 to 11:00	39	5.90	887	4.83
11:01 to 11:30	64	9.68	1,583	8.63
11:31 to 12:00	36	5.45	991	5.40
12:01 to 12:30	41	6.20	966	5.26
12:31 to 13:00	54	8.17	1,354	7.38
13:01 to 13:30	32	4.84	538	2.93
13:31 to 14:00	55	8.32	1,616	8.80
14:01 to 14:30	29	4.39	1,159	6.32
14:31 to 15:00	46	6.96	1,373	7.48
15:01 to 15:30	46	6.96	1,619	8.82
15:31 to 16:00	54	8.17	2,541	13.84
16:01 to 16:30	25	3.78	964	5.25
Totals	661	100.00	18,354	100.00

TABLE 40

FEDWIRE EURODOLLAR TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
8:31 to 9:00	8	2.77	672	6.00
9:01 to 9:30	2	0.69	125	1.12
9:31 to 10:00	2	0.69	31	0.28
10:01 to 10:30	6	2.08	243	2.17
10:31 to 11:00	14	4.84	553	4.94
11:01 to 11:30	12	4.15	324	2.89
11:31 to 12:00	12	4.15	539	4.81
12:01 to 12:30	5	1.73	53	0.47
12:31 to 13:00	22	7.61	731	6.53
13:01 to 13:30	12	4.15	134	1.20
13:31 to 14:00	27	9.34	469	4.19
14:01 to 14:30	36	12.46	1,700	15.18
14:31 to 15:00	39	13.49	1,599	14.28
15:01 to 15:30	4	1.38	106	0.95
15:31 to 16:00	2	0.69	35	0.32
16:01 to 16:30	38	13.15	1,377	12.29
16:31 to 17:00	31	10.73	1,895	16.92
17:01 to 17:30	12	4.15	467	4.17
17:31 to 18:00	5	1.73	147	1.31
Totals	289	100.00	11,200	100.00

TABLE 41

CHIPS EURODOLLAR PLACEMENTS/RETURNS
Cumulative Percentage of Dollar
Value Sent by Time of Day

Time	Placements	Returns
7:30	0.90%	0.00%
8:00	2.67	4.11
8:30	5.49	7.76
9:00	7.15	8.47
9:30	8.54	13.63
10:00	8.74	18.78
10:30	10.03	21.74
11:00	15.53	25.76
11:30	19.97	39.91
12:00	25.75	44.87
12:30	32.07	48.84
13:00	41.48	53.68
13:30	44.69	56.29
14:00	53.71	64.28
14:30	58.04	73.24
15:00	65.65	80.64
15:30	77.27	85.94
16:00	94.53	94.97
16:30	100.00%	100.00%

TABLE 42

FEDWIRE EURODOLLAR PLACEMENTS/RETURNS
Cumulative Percentage of Dollar Value Sent by Time of Day

Time	Placements	Returns
8:30	0.00%	0.00%
9:00	0.00	8.53
9:30	0.00	10.12
10:00	0.00	13.54
10:30	0.14	20.56
11:00	0.14	24.55
11:30	0.43	31.16
12:00	0.97	31.61
12:30	1.50	37.98
13:00	8.41	39.22
13:30	9.49	42.92
14:00	14.83	59.51
14:30	26.66	72.40
15:00	44.22	73.46
15:30	44.91	73.46
16:00	45.98	79.83
16:30	72.33	97.24
17:00	88.06	98.73
17:30	98.59	100.00%
18:00	100.00%	

TABLE 43

FEDWIRE EURODOLLAR TRANSACTIONS
DESTINATION BY FEDERAL RESERVE DISTRICT
($ amounts in millions)

District	Number of Transactions	Percent	Dollar Amount	Percent
Boston	17	5.88	1,475.3	13.17
New York 1/	182	62.98	7,094.4	63.34
Philadelphia	6	2.08	84.6	0.76
Cleveland	8	2.77	266.9	2.38
Richmond	6	2.08	161.5	1.44
Atlanta	2	0.69	8.1	0.07
Chicago	18	6.23	369.7	3.30
St. Louis	1	0.35	10.0	0.09
Minneapolis	0	0.00	0.0	0.00
Kansas City	4	1.38	401.2	3.58
Dallas	7	2.42	271.1	2.42
San Francisco	38	13.15	1,057.6	9.44
Totals	289	100.00	11,200.5	100.00
1/Received by Survey Participants.	144	49.83	5,560.8	49.65

Schedule F: Foreign Exchange Transactions

The various tables summarizing this survey category of transactions appear consecutively as Tables 44 through 49, beginning at page 70.

As suggested earlier, the 27 foreign exchange transactions reported in the Fedwire survey are too few in number to have much solid informational content. Nonetheless, they do show the sorts of differences with the CHIPS data that would be expected. For instance, in the composite survey summaries presented in Tables 44 and 45, 80 percent by value of Fedwire transactions were for domestic customers, while less than 12 percent of CHIPS transactions were so categorized.[2/] Moreover, 90 percent of all CHIPS transactions (by value) were identified as for the account of banks (own account plus "customers" banks), while only 18 percent of Fedwire transactions were placed in that category.

The contract types specified for foreign exchange transactions appear consistent with market statistics gathered in other surveys. Looking at the two surveys aggregated, spot contacts thoroughly dominate both numbers and dollar value of transactions, with option contracts ranking second and forward contracts third.

A rather surprising survey finding is the insignificant share of foreign exchange transactions specifically identified as related to international trade in goods and services, and the correspondingly overwhelming share of transactions attributed to trading and positioning activity. However, both finding may simply

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2/ Again, in this reporting form, survey respondents were asked to treat foreign offices of all banks, including their own, as being foreign customers, and to treat U.S. offices of foreign banks as being domestic customers.

reflect the fact that banks manage foreign exchange portfolios rather than individual customer transactions, and hence are unable to tie transactions made from a portfolio perspective back to specific individual transactions initiated by their commercial customers.

Tables 46 and 47 list foreign exchange transactions by time of day for CHIPS and Fedwire respectively. The CHIPS transactions are spread quite evenly throughout the day, both in numbers of transactions and dollar value. By contrast, the Fedwire foreign exchange transactions were bunched at the end of the day, with half of the transactions and 70 percent of the transactions value occurring after the 4:30 p.m. CHIPS close. The peculiar time profile suggests the possibility Fedwire may have simply served as the vehicle for effecting some transactions that for one reason or another could not be made over CHIPS in a timely fashion. That conclusion is also consistent with the Fedwire destination data (Table 48), which show that all but one of the Fedwire payments went to Second District receivers.

Finally, Table 49 lists the foreign exchange transactions in each survey broken down by the currencies most frequently identified in the responses. Not surprisingly, the Japanese Yen and the German Mark were the dominant currencies transacted, with the Yen accounting for the greater transactions value and the Mark the larger number of transactions. The British Pound was third in both frequency and value of transactions, while the Canadian Dollar, the Swiss Franc and the French Franc closely competed for the ranking of fourth.

TABLE 44

CHIPS FOREIGN EXCHANGE TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Origination:				
In U.S. for own account	109	6.15	1,536	6.54
In U.S. for Domestic Customer	109	6.15	2,743	11.69
Outside U.S.	1,555	87.70	19,197	81.77
Customer Type:				
Bank	1,581	89.17	19,648	83.69
Nonbank Financial	112	6.32	3,008	12.81
Nonfinancial	14	0.79	188	0.80
Unspecified	66	3.72	632	2.69
Contract Type:				
Spot	1,332	75.13	13,755	58.59
Forward	89	5.02	1,394	5.94
Swap	110	6.20	3,455	14.72
Option	4	0.23	48	0.20
Other	8	0.45	116	0.49
Unspecified	230	12.97	4,708	20.05
Purpose:				
Trade	17	0.96	395	1.68
Investment	19	1.07	442	1.88
Trading/Positioning	1,678	94.64	21,547	91.78
Funding	10	0.56	103	0.44
Other	2	0.11	15	0.06
Unspecified	47	2.65	974	4.15
TOTALS	1,773	100.00	23,476	100.00

TABLE 45

FEDWIRE FOREIGN EXCHANGE TRANSACTIONS
COMPOSITE DESCRIPTION
($ amounts in millions)

	Number of Transactions	Percent	Dollar Amount	Percent
Origination:				
In U.S. for own account	1	3.70	5	2.04
In U.S. for Domestic Customer	19	70.37	195	79.71
Outside U.S.	7	25.93	45	18.25
Customer Type:				
Bank	11	40.74	39	15.76
Nonbank Financial	10	37.04	158	64.42
Nonfinancial	5	18.52	43	17.77
Unspecified	1	3.70	5	2.04
Contract Type:				
Spot	12	44.44	75	30.72
Forward	3	11.11	26	10.43
Swap	4	14.81	43	17.59
Option	3	11.11	85	34.74
Other	1	3.70	2	0.92
Unspecified	4	14.81	14	5.59
Purpose:				
Trade	1	3.70	7	2.69
Investment	1	3.70	2	0.92
Trading/Positioning	24	88.89	227	92.84
Funding	--	--	--	--
Other	--	--	--	--
Unspecified	1	3.70	9	3.56
TOTALS	27	100.00	245	100.00

TABLE 46

CHIPS FOREIGN EXCHANGE TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
7:01 to 7:30	36	2.03	402	1.72
7:31 to 8:00	165	9.32	1,686	7.21
8:01 to 8:30	154	8.70	1,302	5.57
8:31 to 9:00	112	6.32	951	4.07
9:01 to 9:30	139	7.85	1,403	6.00
9:31 to 10:00	62	3.05	402	1.72
10:01 to 10:30	96	5.42	1,179	5.04
10:31 to 11:00	131	7.40	1,220	5.22
11:01 to 11:30	126	7.11	1,497	6.40
11:31 to 12:00	71	4.01	1,085	4.64
12:01 to 12:30	121	6.83	1,486	6.36
12:31 to 13:00	75	4.23	833	3.56
13:01 to 13:30	101	5.70	1,227	5.25
13:31 to 14:00	105	5.87	2,094	8.74
14:01 to 14:30	82	4.63	2,073	8.87
14:31 to 15:00	78	4.40	1,817	7.77
15:01 to 15:30	51	2.88	950	4.07
15:31 to 16:00	43	2.37	1,277	5.27
16:01 to 16:30	25	1.41	592	2.53
Totals	1,773	100.00	23,476	100.00

TABLE 47

FEDWIRE FOREIGN EXCHANGE TRANSACTIONS
BY TIME OF DAY
($ amounts in millions)

Time	Number of Transactions	Percent	Dollar Amount	Percent
9:31 to 10:00	2	7.41	8	3.10
10:01 to 10:30	1	3.70	11	4.66
10:31 to 11:00	1	3.70	5	2.13
11:01 to 11:30	1	3.70	2	0.92
11:31 to 12:00	2	7.41	19	7.75
12:01 to 12:30	0	0.00	0	0.00
12:31 to 13:00	1	3.70	1	0.60
13:01 to 13:30	0	0.00	0	0.00
13:31 to 14:00	2	7.41	4	1.64
14:01 to 14:30	1	3.70	5	2.04
14:31 to 15:00	2	7.41	12	5.08
15:01 to 15:30	0	0.00	0	0.00
15:31 to 16:00	0	0.00	0	0.00
16:01 to 16:30	1	3.70	3	1.23
16:31 to 17:00	7	25.93	63	25.64
17:01 to 17:30	1	3.70	9	3.56
17:31 to 18:00	4	14.81	97	39.61
18:01 to 18:30	1	3.70	5	2.04
Totals	27	100.00	245	100.00

TABLE 48

FEDWIRE FOREIGN EXCHANGE TRANSACTIONS
DESTINATION BY FEDERAL RESERVE DISTRICT
($ amounts in millions)

District	Number of Transactions	Percent	Dollar Amount	Percent
Boston	1	3.85	10.4	4.29
New York 1/	25	96.15	232.2	95.71
Totals	26	100.00	242.6	100.00
1/Received by Survey Participants.	15	57.69	80.7	33.26

TABLE 49

FOREIGN CURRENCY TRANSACTIONS BY CURRENCY BY WIRE SYSTEM
($ Amounts in Millions)

Currency	CHIPS				Fedwire			
	Number of Transactions	Percent	Dollar Amount	Percent	Number of Transactions	Percent	Dollar Amount	Percent
Australian Dollar....	12	0.8	79	0.4	1	4.3	5	2.3
Austrian Schilling...	1	0.1	5	0.0	--	--	--	--
Belgian Franc.....	12	0.8	208	1.1	--	--	--	--
British Pound.....	189	12.2	2,043	10.9	1	4.3	16	7.1
Canadian Dollar.....	50	3.2	1,025	5.5	1	4.3	15	6.5
Danish Krone.....	4	0.3	36	0.2	--	--	--	--
French Franc.....	89	5.8	1,406	7.5	--	--	--	--
German Mark.....	522	33.8	5,187	27.6	5	21.7	48	20.7
Hong Kong Dollar.....	6	0.4	55	0.3	--	--	--	--
Italian Lira.....	29	1.9	208	1.1	--	--	--	--
Japanese Yen.....	385	25.0	6,078	32.4	9	39.1	101	43.8
Netherlands Guilder..	14	0.9	196	1.0	--	--	--	--
New Zealand Dollar...	3	0.2	14	0.1	--	--	--	--
Norwegian Krone.....	5	0.3	45	0.2	--	--	--	--
Singapore Dollar.....	10	0.6	79	0.4	--	--	--	--
Spanish Peseta.....	16	1.0	58	0.3	--	--	--	--
Swiss Franc.....	105	6.8	824	4.4	1	4.3	10	4.5
Other Specified..... Currencies	33	2.1	360	1.9	--	--	--	--
Unspecified..... Currencies	52	3.4	822	4.4	4	17.4	26	11.2
Multiple Currencies..	6	0.4	39	0.2	1	4.3	9	3.9
Totals.....	1,543	100.0	18,768	100.0	23	100.0	231	100.0

APPENDIX

SURVEY QUESTIONNAIRE FORMS

Schedule A

DOLLAR TRANSFER RELATED TO SECURITIES PURCHASE/REDEMPTION/FINANCING

_____ 1. CHIPS _____ 2. Fedwire Message Time: _____

Sending Bank Name: _____

Receiving Bank Name: _____

Amount of Transfer: $_____

Payment Instruction Initiated By/For:

_____ 1. Bank's Own Investment Account
_____ 2. Bank's Own Trading Account
_____ 3. Bank's Own Other Account _____
(Specify account)

_____ 4. Broker/Dealer _____
(Specify firm's name and type of account)

_____ 5. Investor Customer _____
(Specify customer's name and type of account)

_____ 6. Security Issuer

Instrument: (Name of Issuer _____)

_____ 1. Bankers Acceptance
_____ 2. Book-Entry Security--Fedwire
_____ 3. Certificate of Deposit--Domestic
_____ 4. Certificate of Deposit--Euro
_____ 5. Commercial Paper
_____ 6. Corporate Bond/Note
_____ 7. Corporate Stock
_____ 8. Eurobond/Note
_____ 9. Mortgage-Backed Security--Definitive
_____ 10. Municipal Security
_____ 11. Other _____
(Specify)
_____ 12. Miscellaneous Pool of Loan Collateral

Nature of Transaction: _____ 1. New Issue Transaction
_____ 2. Secondary Market Transaction
_____ 3. Payment at Maturity

_____ 1. Investment
_____ 2. Trading
_____ 3. Underwriting
_____ 4. Repurchase Agreement
_____ 5. Collateralized Broker/Dealer Loan
_____ 6. Safekeeping Transaction
_____ 7. Other _____

Schedule B

BANK LOAN TRANSACTIONS*

_____ 1. CHIPS _____ 2. Fedwire Message Time: _____

Sending Bank Name: _____

Receiving Bank Name: _____

Amount of Transaction: $_____

Name of Borrower _____

Business of Borrower _____

Nature of Transaction:

_____ 1. Disbursement of Principal to Borrower

_____ 2. Purchase of Loan Participation

_____ 3. Customer Drawdown on Loan Facility

_____ 4. Payment by This Bank's Customer on a Third-Party Loan

_____ 5. Payment to Lead/Agent Bank of This Bank's Share of a Syndicated Loan

_____ 6. Disbursement of Borrower's Payments Received by This Bank to Another Participant in Our Syndicated/Participated Loan

* Include all loans other than loans to finance securities brokers or dealers. The latter are to be reported on Schedule A.

Schedule C

FEDERAL FUNDS TRANSACTIONS

_____ 1. CHIPS _____ 2. Fedwire Message Time _____

Sending Bank Name: _____

Receiving Bank Name: _____

Amount of Transfer: $_____

Transaction For:

_____ 1. Own Account

_____ 2. Customer (name) _____

Nature of Transaction:

_____ 1. Sale of Federal Funds

_____ 2. Return of Federal Funds Purchased

Original Maturity:

_____ 1. Overnight

_____ 2. Continuing Contract

_____ 3. Term (specify) _____
(Number of days)

Schedule D

COMMERCIAL AND MISCELLANEOUS TRANSACTIONS

_____ 1. CHIPS _____ 2. Fedwire Message Time: _____

Sending Bank Name: _____

Receiving Bank Name: _____

Amount of Transfer: $_____

Transaction For:

_____ 1. Own Account

_____ 2. Customer (name)_____

Nature of Transaction:

_____ 1. Purchase of Goods or Services

_____ 2. Concentration in a Lead Account of Cash from Other Accounts of the Same Organization*

_____ 3. Dispersion From a Lead Account of Cash to Other Accounts of the Same Organization*

_____ 4. Domestic Time Deposit Placement/Return

_____ 5. Return of Erroneous Transfer or Other Correction of Error

_____ 6. Other** (Please describe)_____

_____

* Should also include, where appropriate, transfers between affiliates of the same organization.

** Should not be used to record transfers to settle CHIPS, Euroclear, Cedel or similar positions; refer to Schedule E.

Schedule E

SETTLEMENT TRANSACTIONS

_____ 1. CHIPS _____ 2. Fedwire Message Time:_____

Sending Bank Name: _____

Receiving Bank Name: _____

Amount of Transfer: $_____

Transaction For:

_____ 1. Own Account

_____ 2. Customer (name) _____

Purpose of Transaction:

Settlement of:

_____ 1. CHIPS Position
_____ 2. Depository Trust Company Position
_____ 3. MBSCC Position
_____ 4. Euroclear Position
_____ 5. Cedel Position
_____ 6. Check Clearings
_____ 7. Correspondent Balance Adjustment
_____ 8. ACH Position
_____ 9. Other _____
(Please specify)

Schedule F

DOLLAR TRANSFERS RELATED TO FOREIGN EXCHANGE/EURODOLLAR PLACEMENTS

_____ 1. CHIPS _____ 2. Fedwire Message Time: _____

Sending Bank Name: _____

Receiving Bank Name and Location: _____

_____

Amount of Transfer: $_____

Payment Instruction Initiated By/For:**

_____ 1. Bank's Own Account

_____ 2. Domestic Customer _____
(Specify Name)

_____ 3. Foreign Customer _____
(Specify Name and Country)

Principal Business Classification of Customer (Please Check):

_____ 4. Bank _____ 5. Nonbank Financial Institution

_____ 6. Nonfinancial Institution

Nature of Transaction:

Eurodollar Deposit/Placement for _____ days (Specify Original Term and Check Below)

_____ 1. Original Transaction _____ 2. Repayment

Foreign Exchange Transaction_____
(Give Name of Currency and Check Below)

_____ 3. Spot _____ 4. Forward _____ 5. Swap

_____ 6. Option _____ 7. Other (specify) _____

Purpose of Transaction:

_____ 1. Trade/Service Related
_____ 2. Investment
_____ 3. Foreign Exchange Trading/Positioning
_____ 4. Funding of Position
_____ 5. Other (specify) _____

_____

_____

** For purposes of this section, please treat foreign offices of all banks (including your own) as being "foreign customers", and treat U.S. offices of foreign banks as being "domestic customers".

Securities Lending

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SECURITIES LENDING

I Executive Summary

This paper examines the practice of lending securities. The primary focus is on the lending of Treasury and Agency securities in the domestic market.[1] Offshore activities and the lending of other securities are briefly discussed in the Appendices.

Securities lending is not a single business. The lending of each kind of security (Governments, stocks, corporate bonds, and mortgage-backed securities) has its own conventions and procedures. These pose risks to participants that are often quite different from instrument to instrument. Because of this diversity, general statements about securities lending are not made easily. Instead, we have tried to document "basic" transactions and identify the corresponding risks borne by participants. We have described securities lending as a separate and distinct activity from the repurchase agreement market whenever possible. Ultimately, however, it may be more practical to view securities loans and repurchase agreements as parts of the same market -- the collateral market. The data marshaled to support these observations is largely anecdotal, but has been received from knowledgeable individuals active in trade associations.

A securities loan typically involves three parties:

- Lenders supply securities for loans.
- Borrowers use those securities for trading or operational purposes.
- Agents arrange securities loans.

The lender is usually a long-term investor, such as a pension fund, endowment, foundation, or an insurance company. The lender's incentive to supply securities is fee income with minimal, or at least controlled, risk. The borrower is usually a broker/dealer in need of

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[1] Throughout this paper, the terms Treasury security and Government security are used interchangeably.

securities either to implement an investment strategy, such as covering a short position, or for operational purposes, such as avoiding a fail-to-deliver. The agent is usually a commercial bank with extensive custodial operations. The agent (or agents) provide two services: custody of the lendable securities and arrangement of the terms and conditions of the loan. The agent may also indemnify the lender for certain losses that might result from the transaction.

On December 31, 1987, domestic securities worth an estimated $45 billion were out on loan. Approximately 60 percent were Treasury and Agency securities; 30 percent were domestic equities, and the remainder were corporate bonds and other securities.[2]

A typical loan of Treasury securities is initiated by a government securities dealer who seeks to borrow a specific issue. The dealer will telephone several, and frequently many, banks that have agreements to lend Treasuries with their trust or custody customers. The dealer will pay a fee for the use of the specified securities and pledge other securities as collateral. The amount of the fee and the form of collateral are negotiated with the agent bank. The market value of the pledged collateral is conventionally set at 102 percent of the market value of the securities loaned. Cash and letters of credit, as well as securities, may be used as collateral. Although the loan's term is conventionally open-ended, loan fees and collateral are repriced daily.

Many lenders employ an agent in these transactions, although a few large pension and endowment funds lend directly. The agent collects and marks-to-market the securities pledged as collateral, collects the fee from the borrower, and may also indemnify the lender against default by the borrower. As compensation for these services, and to offset the

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[2] Statistics on securities loans are not available from published sources. Our estimates were based upon conversations with market participants. Data reported by broker/dealers on their FOCUS reports to the SEC support the anecdotal findings.

associated operating costs, the agent typically splits the fee with the lender. Agents also search for borrowers and monitor their creditworthiness.

Securities lending, especially as it relates to government securities, appears to have matured in the 1980s and now involves the largest domestic securities firms, banks and pension funds. The dollar amount of loans outstanding and variety of lending arrangements makes this activity an important element in the functioning of several financial markets. Securities loans expedite short positioning and reduce fails-to-deliver. The Group of 30 noted in its report on clearance and settlement systems in the world's securities markets, published in March 1989, that securities lending is recommended as a method for achieving final settlement in securities markets. Also, securities lending provides an additional source of income for the banking industry and participating lenders.

The lending process itself has weathered the stock market crash of 1987 and the volatility of the debt markets that followed it. Global lending and the immobilization and lending of mortgage-backed securities promises new profit opportunities. On the other hand, margins on domestic lending activity have generally narrowed over the past two years. This has come at a time when many agents and borrowers have committed more resources (staff, hardware and software) to the business. There is no consensus opinion on why margins have narrowed, but competitive pressures are probably at work. There has also been an increasing incidence of direct lending, according to some industry participants. Such activity might accelerate if lenders, especially large insurance companies and pension funds, gain access to broker screens listing dealer securities loan requirements.

Finally, the impact of the new Risk-Based Capital Guidelines on securities lending activity remains to be seen. These guidelines, which are discussed in detail below, will probably raise agents' costs because capital must be set aside for indemnification. The ability of agents

to persuade lenders to accept lower fee income, forgo indemnification, or accept an altered version of indemnification will determine the future form of loan transactions involving agents.

II Securities Loans Described

Securities lending transactions may differ with respect to the kind of securities on loan, means of revenue generation, and forms of collateral. The four basic types of lending transactions are:

1. Borrow v. Pledge
2. Borrow v. Cash
3. Borrow v. Letter of Credit
4. Borrow Program

In determining which type of lending transaction to use, the borrower will probably have a preference based upon the sought-after collateral. However, borrowers are likely to defer to the lender's requirements and might even be willing to create a new transactional form to satisfy a significant lender.

Borrow v. Pledge. In a borrow v. pledge securities loan transaction, the lender accepts other securities as collateral. The securities posted as collateral can be either similar or dissimilar to the loaned securities. For instance, a government securities borrowing can be collateralized by other governments, or agencies, or mortgage-backed securities.[3]

As is the case with most domestic securities loans, borrow v. pledge loans are typically collateralized at 102 percent of loan value. Loans of international equities are collateralized at 105 percent of loan value. While collateral margins are open to negotiation, participants rarely vary from these norms.

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[3] Prudent lenders will seek collateral whose price volatility is similar to the loaned securities; however, there is no strict requirement of like securities in this transaction type. Through the use of a bank letter of credit, other types of securities may also serve effectively as collateral. See the discussion below at Section III.C.3.

In this transaction, the lender is paid a fee upon return of the borrowed securities. Traditionally, the amount of this fee was about 50 basis points.[4] Recently the typical fee has narrowed to around 25-35 basis points. In general, the fee is related to the spread between the repurchase ("repo" or "RP") rate for general collateral and the reverse repurchase ("reverse repo" or "RRP") rate for the loaned security.[5] In theory, if the fee were larger than the RP-RRP spread, the securities borrower could reduce its funding costs by borrowing cash in the RP market and "lending" these funds against the desired securities in the RRP market. Similarly, if the fee were smaller than the RP-RRP spread, the lender could improve his earnings by lending the security against cash in the RRP market and investing the proceeds in the RP market. In practice, however, the securities loan fee does not always equal the RP-RRP spread. Borrowers, for instance, might be willing to pay a larger fee in return for the confidentiality of a securities loan transaction over a RRP.[6] At the same time, lenders might not always find a demand for their collateral or not have access to the RP market. As a result, they accept a smaller fee than the benchmark RP-RRP spread.

This type of loan transaction probably accounts for 25 percent of the lending market in government securities, down from 40-45 percent a few years ago. Much of the relative decline in usage of this type of transaction results from the stronger relative growth of the borrow v. cash transaction, rather than an absolute decline.

Borrow v. Cash. Some participants described this transaction type as the most popular form of securities loan, accounting for about half of all lending in the government

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[4] That is, one-half percent annually of the par value of bonds borrowed.

[5] A full explanation of this relationship is provided in Chapter VI, Pricing Securities Loans.

[6] The benefit of confidentiality can have substantial value to a dealer with a large short position in a particular security. If other dealers were aware of this position they might attempt to squeeze the dealer who is short by hoarding the outstanding supply of that issue.

securities market.[7] This type of securities loan resembles a RRP transaction in that specified securities are borrowed against cash. Although this transaction type is functionally equivalent to the RRP transaction, it differs in price quotation terminology: in a securities loan the securities borrower (that is, cash lender) receives a "rebate" for "lending" cash; in an RRP transaction, the securities borrower (that is, cash lender) receives interest on its cash loan. In both cases, however, the implicit fee "paid" to borrow securities equals the spread between the interest rate (or "rebate") received by the securities borrower and the generally higher interest rate paid by the securities borrower for obtaining cash in the RP market.

For securities borrowers, this transaction type fits more easily into general financing activity, which probably accounts for much of its increased popularity. This is particularly true for matched-book activity. From a lender's perspective this transaction type offers several advantages. The chief advantage for the lender is that the lender and its agent can attempt to maximize profits through investing the cash proceeds at money market rates that are generally higher than RP rates. Secondarily, cash is a more liquid form of collateral than pledged securities, at least so long as the borrower meets his obligation to tender more cash if required by the mark-to-market process.[8]

In this transaction type, the securities borrower negotiates a "rebate" rate on his cash collateral in exchange for the desired security. The securities lender surrenders the desired security and pays the "rebate" rate at the loan's maturity. In the interim, the securities lender (that is, cash borrower) invests the cash collateral and attempts to earn more than the standard

---

[7] However, at least one large borrower prefers to avoid this transaction type in favor of either a RRP or a borrow v. pledge securities loan.

[8] Setting of the borrower's rebate and the lender's cash management opportunities will be discussed at length in Chapter VI of this paper under pricing considerations. However, the gist is that the lender or its agent hopes to earn more than the general RP rate in managing the cash collateral.

fee arrangement of the borrow v. pledge. As is typical of domestic lending transactions, 102 percent collateral is required by the lender in this transaction type.[9]

Borrow v. Letter of Credit. In this transaction, the securities borrower obtains an irrevocable letter of credit ("LOC") as collateral for the loan. The lender instructs its clearing bank to deliver the requested securities to the borrower and keep them on loan as long as the LOC exceeds 102 percent of the market value of securities loaned. The lender receives a fixed fee per loan, much like the pledge transaction. However, the fee is usually lower in this type of transaction (i.e., 20-25 basis points). The fee is lower than in the pledge transaction because (1) the borrower pays for the LOC, (2) there may be less liquidity risk should the borrower default (the LOC may be more liquid than pledged securities), and (3) the credit quality of the bank may be superior to that of the borrower.

Although this transaction has existed since the 1960s, its use accounts for less than 10 percent of all government securities lending today. The allure of a borrow vs. LOC may be further damaged because LOCs require capital support under the Risk-Based Capital Guidelines.

Borrow Program. The newest of the transaction types, the borrow program presently accounts for about 15 percent of the government lending market. This transaction type is also becoming popular in the less developed mortgage-backed securities lending market, partially because it is also a convenient way to borrow when pledging esoteric or illiquid collateral. It is unique among transaction types in that its fee structure is not based on the value of the securities that are actually loaned. Instead, under a borrow program a lender sells the right to borrow from a portfolio of securities for a period of time, typically on a monthly or annual

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[9] Some borrowers prefer to pledge 100 percent collateral when pledging cash, as this is the convention in the RP market. Moreover, when these borrowers do remit 102 percent cash collateral they increase the lender's "rebate" rate by a few basis points to obtain a return on their excess collateral.

basis. The fee negotiations are conducted at the beginning of the period, with fees typically ranging from 15-30 basis points of the par value of the securities loaned. While the fee is set at the beginning of the period, it can be applied in at least two ways; (1) the fixed fee may be applied to the volume of loans entered over a given period, with payment occurring at monthly intervals, or (2) the fixed fee may be applied to the size of the portfolio made available for loan, with payment occurring as an initial lump sum.[10]

Another noteworthy feature of this transaction type is the characteristic presence of a tri-party bank. The tri-party bank is not necessary, but it adds additional comfort. This comfort is sought because of the generally complex nature of collateral valuation and margin maintenance for borrow program collateral. In borrow programs, dealers typically pledge mortgage securities as collateral for loans of government securities. The pledged mortgage collateral is almost always in many more pieces than an equivalent amount of Treasury securities; thus, the operational tracking of mortgage principal and interest payments, and mortgage collateral margin maintenance, requires additional effort. For fees ranging from two to 4-1/2 basis points, the tri-party bank will assume this burden. Dealers always pay the tri-party bank's fee in an effort to induce lenders to enter into this transaction type. Tri-party banks usually limit their liability by contract to simple negligence, though they are willing to assume a higher degree of responsibility upon payment of a higher fee, usually 10 basis points.

Where lenders enter programs directly with the borrower, the agent's absence provides much of the economic incentive to the lender who no longer has to split fees. The lender may also be attracted by the lump sum fee arrangement, in that revenue can be readily

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[10] In general, readers should remain mindful that borrow programs are structured in many different forms, making all generalizations about this transaction type tentative.

anticipated.[11] As is typical in all lending transactions the lender is still free to turn over the portfolio throughout the lending period under a borrow program.[12]

A representative from a large borrower pointed out an interesting use of government borrow programs. Some dealers use borrow programs to finance long positions in mortgage-backed securities rather than using borrow programs strictly to finance short positions in governments. Of course, a single borrow program can be used in both ways.

Borrow programs finance long mortgage positions when used in conjunction with a government RP. First, dealers structure a borrow program through which they can borrow governments and pledge mortgage securities as collateral. In structuring programs for this purpose, dealers attempt to acquire general government collateral rather than "special" collateral, as their primary aim is to finance a long mortgage position rather than a short government position. By seeking general collateral instead of special collateral dealers seek to minimize the cost of the borrow program.

Once such a borrow program is in place, a dealer can finance long mortgage positions, on an ongoing basis, by arranging government RPs with settlements corresponding to the settlement of a purchased mortgage security. The cash from the RP is used to purchase mortgage securities. The mortgage securities are posted as collateral for the loan of government securities through the program. In completing the transaction, the borrowed governments are sent out as collateral on the government RP.

The cost of financing a mortgage security purchase through this method can be viewed as the government RP rate plus the borrow program fee. Thus, long mortgage positions

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[11] However, a lender may also suffer substantial opportunity costs if the assets in its portfolio become scarce during the program.

[12] Diagrams of the mechanics of each of the four transaction types are attached at Appendix D.

can be financed at the government RP rate plus 15-30 basis points, with the size of the spread a function of conditions in the government securities collateral market.

Use of borrow programs in combination with government RPs may also present an arbitrage opportunity for mortgage RP market participants. If the spread between the mortgage RP and government RP rates exceeds the borrow program fee, dealers could arbitrage by replacing the mortgage purchase with a mortgage RRP.

If the spread between mortgage RP and government RP rates is less than the borrow program fee, mortgage security purchases could be made more cheaply by using a mortgage RP. It should be noted that this second instance exposes participants to an opportunity cost, instead of presenting an arbitrage opportunity. Despite this possible opportunity cost, entering borrow programs to facilitate financing of long mortgage positions remains attractive to mortgage dealers, as the programs provide both a stable source of financing as well as a potential arbitrage opportunity. Thus, government borrow programs provide some linkage between pricing developments in the government and mortgage RP markets.

III The Business

A. Domestic Activity

A wide variety of securities are lendable:

1. Treasuries
2. Equities
3. Agencies
4. Corporate bonds (high-grade)

5. Mortgage-Backed securities (usually Ginnie Mae's)

6. Foreign securities

Securities lending has been a "hidden activity" insofar as there is no publicly available sources on the number, dollar value and terms of such loans. Some information is collected from bank agents by bank regulators on Call Reports, but these data are too aggregate to be useful for analysis. The commingling of securities loans with other contingent liabilities (such as standby letters of credit, etc.) appears to be a common problem in this regard. Some information is also collected from broker/dealer borrowers on FOCUS reports filed with their designated self-regulatory organization ("DSRO"), usually the National Association of Securities Dealers or a stock exchange. (The U.S. Securities and Exchange Commission receives a tape from each DSRO of FOCUS data.) Again, these data are difficult to analyze because they include securities loans for a variety of instruments and terms. Lenders may disclose securities lending income, if it is material, on their Series 5500 filings with the Internal Revenue Service and U.S. Department of Labor. (Governmental plans under the Employee Retirement Income Security Act ("ERISA") are exempt from those filings.) However, no information is collected from lenders about their agreements and outstandings.

Three trade associations are active in securities lending matters: One represents agents and the other two represent borrowers. The agents' group is the Securities Lending Committee of Robert Morris Associates (Philadelphia, Pa.) ("RMA"). RMA is the national organization of bank credit officers. Although they have provided the Securities Lending Committee with an organizational umbrella, RMA's primary focus continues to be the sharing of credit information (via well-known industry financial ratio handbooks). The major New York and Chicago banks are well-represented on the steering committee of RMA's Securities Lending Committee.

The borrowers' groups are the Securities Lending Committee of the Securities Industry Association ("SIA") and the Public Securities Association ("PSA"). SIA is a national organization of broker/dealers. The group lobbies DSROs on behalf of its diverse membership and has been particularly active in streamlining settlement rules. In the securities lending area, the SIA has also sought to reduce collateralization levels, broaden the scope of eligible collateral and achieve greater uniformity in loan contract provisions. The PSA, an organization of government and municipal bond dealers, provides a forum for borrowers on many of these matters.

B. Mechanics

The mechanics of the borrow v. cash transaction type are similar to the mechanics of the RP/RRP transaction. In a conventional RP transaction, one party seeks to borrow money and is willing to put up securities as collateral and to pay interest to the lender of funds. At maturity the borrowed funds, plus interest, and collateral are returned to the counterparties. A RRP is essentially the same transaction but is initiated by the money lender: the lender seeks out a counterparty in need of cash, lends the cash, and obtains securities, either of a specified type or unspecified, as collateral; the cash plus interest and the collateral are returned to the counterparties at maturity. In both cases, the securities borrower obtains the securities he desires and the cash lender earns interest on the funds.

While RP/RRP transactions can be described in terms of each counterparty's desire to borrow or to lend cash, they can also be viewed as being driven by the desire to borrow or to lend securities. From this perspective, the parallels between a RRP and the borrow v. cash securities loan become unmistakable.

In a RRP, the initiating party may focus on either the lending-of-cash aspect or the obtaining-of-collateral (that is, securities borrowing) aspect. To discern which is the prime

motivation, one can look at the interest rate charged. If the rate is in line with market interest rates for the term of the loan (i.e., the RP rate), the initiating party is probably focusing on the cash-lending aspect of the transaction. If, however, the RRP rate is well below the comparable RP rate, the initiating party is probably focusing on the securities-borrowing aspect of the transaction.

The securities used as collateral can also indicate the motivation of an RRP. The RRP marketplace is two-dimensional in that RRP loans can be made against either general (unspecified) collateral, or particular (specified) collateral. The RRP market for specified securities is also referred to as the specials market. In a RRP for general collateral, the cash lender does not specify the collateral it receives, whereas in the specials market the cash lender specifies the desired security. If the RRP is in the general collateral market, the initiating party's focus is on lending cash and maximizing the interest earned. If the RRP is in the specials market, the cash lender is willing to accept a lower interest rate in order to obtain the desired collateral.

A borrow v. cash securities loan transaction type is economically and mechanically equivalent to a RRP in the specials market: in both cases the initiating party's focus is on borrowing securities rather than lending cash.[13] The differences between the two transactions are essentially legal and accounting distinctions.

The mechanics of a borrow v. pledge security loan type differ from a borrow v. cash. In a borrow v. pledge there are two securities transfers, whereas there is only one in a borrow v. cash.

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[13] This view is supported by a broad definition of the specials market, in which specials are any securities the dealer is short. Thus, the market price of the collateral may not be very different from the price of general collateral, but the dealer would be willing to endure a price concession for the desired collateral if the market price became special.

The securities lender is paid a fee upon return of the securities. As described above, this fee is almost always the same as the spread between the RP and RRP rates for the same securities. In light of this pricing relationship, borrowers choose between a borrow v. pledge loan or a RP/RRP transaction based upon legal and accounting considerations rather than for economic reasons. Some of a dealer's customers are legally prohibited from engaging in repurchase transactions and rely upon the borrow v. pledge transaction type. Such customers include municipalities, pension funds and insurance companies.

The borrow program's mechanics are similar to the mechanics of the borrow v. pledge with one important exception -- fee structure. While the borrow v. pledge fee is paid transactionally, upon a loan's maturity, the borrow program fee may be received as an initial lump sum payment before any securities are lent or on a monthly billing cycle. This difference arises from the non-transactional nature of the borrow program transaction type, as the total fee is based on either the fixed fee times the volume of securities lent or the fixed fee times the securities made available for loan, rather than varying security by security.

The borrow program is the only form of securities loan in which the lender grants borrowing rights to a portfolio of assets rather than to specific assets on a transaction by transaction basis. Such an arrangement requires the lender to segregate and track the lendable portfolio separately from its general portfolio, giving the borrower a view of the available securities.[14] Use of a tri-party bank in borrow programs adds an additional participant to the securities transfer chain, but otherwise does not affect the mechanics. While tri-party banks are not a requisite of borrow programs, they are frequently present.

Regardless of whether a borrow v. cash, borrow v. pledge or a borrow program is used, government securities are delivered against cash payment over the relevant payments

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[14] Under a borrow program the lender is still able to turn over its portfolio freely; it is simply restricted from lending from that portfolio to other borrowers.

system. "Free" transfers of securities are never used in these three transaction types because the transferer would be exposed to the risk of a failure by its counterparty. A "free" transfer of securities is one in which securities are sent over the wire without any corresponding receipt of funds. In the borrow v. cash transaction, such transfers are straightforward, as one transfer of securities against cash satisfies the transaction. In the borrow v. pledge, two wire transfers are necessary: (1) the borrowed securities are sent against funds, and (2) the pledged collateral is sent against funds. The cash value of these two transfers are identical, leaving the borrower with the desired security and the lender with the pledged security. Both securities transfers are made against funds to forestall serious loss by either party in the event of one party's failure to perform. In a borrow program, securities are also wired against funds, with the tri-party bank typically adding another layer to the transfer process.

The final transaction type, the borrow v. letter of credit, is perhaps the least complex of the four transaction types in terms of securities transfer mechanics. Once the lender receives a letter of credit from the borrower's bank, securities are wired to the borrower "free" so long as the value of the borrowed securities remains less than the value of the letter of credit. Borrow v. LOC is the only transaction type under which securities are transferred "free."

Settlement conventions and treatment of accrued interest, in the case of bonds, and dividends, in the case of stocks, depend upon the security lent rather than the loan's transaction type. For loans involving government securities, accrued interest is included in the loan's market value for the purpose of determining a loan's initial collateralization requirement. That is, the securities lender requires 102 percent of the sum of the note or bond's price plus accrued interest. Subsequently, accrued interest is accounted for on a daily basis when marking

the loan's collateral to market. On coupon payment date, the borrower pays the coupon amount to the lender in the context of a mark-to-market.[15]

For loans involving equities, if the borrower holds the security on dividend payment date, the borrower receives the dividend and remits it back to the lender on the same day. Despite this cash flow wash, some foreign borrowers can account for this cash as dividend income. Such tax treatments create demand for securities loans in the equities market, which is independent of short positioning.

Loans for both governments and equities are typically settled on a same-day basis given sufficiently early notification. For governments, notification must be made by 10:00 A.M. for same-day settlement. Thus, a lender of governments can freely sell its loaned securities for normal next day settlement, notifying the borrower on the following morning. Termination of an equities loan is usually for corporate or five-day settlement. This longer settlement period does not hinder a lender's ability to sell its loaned equity security, as cash equity sales conventionally settle in five business days.

C. Regulation

Specific Federal regulation of securities lending applies primarily to the activities of broker/dealers. The U.S. Securities and Exchange Commission ("SEC") and Board of Governors of the Federal Reserve System ("Fed") have promulgated regulations governing prudential operation of securities lending and the credit aspects of the business, respectively. These regulations apply to broker/dealers acting as both borrowers and lenders of securities.

Entities that are not broker/dealers are much less regulated. Lenders are regulated only insofar as they are regulated generally. Pension funds and insurance companies,

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[15] Since accrued interest is accounted for on a daily basis, the lender effectively receives just one day's interest on coupon payment date. Coupon payments and redemptions at maturity should be viewed as separate events from interest accrual and marking-to-market for legal and accounting purposes.

as noted above, appear to be the largest institutional lenders. Pension funds are subject to ERISA. Insurance companies are not subject to general Federal regulation but rather are subject to regulation by the states. Banks may operate as both borrowers and lenders of government and agency securities and municipal securities inasmuch as they may invest and deal in them; they may also operate as agent for lenders in connection with their custodian and trust activities.

Pensions plans and ERISA. The regulations promulgated under ERISA prohibit securities lending from a pension plan to a bank or a broker/ dealer that are "parties in interest" with the plan. A party in interest includes any entity that executes securities transactions on behalf of plans and/or renders investment advice to them.[16] Accordingly, without an express exemption such a party could not engage in transactions with a plan. However, an express exemption applies to securities lending transactions with a party so long as certain conditions -- which generally follow market practices for securities loans -- are met.[17]

Bank regulators and banks. The Federal Financial Institution Examinations Council ("FFIEC") issued a statement on bank activities in the securities lending business ("Statement") in 1985.[18] The Statement provides guidelines under which bank activities as a lender and as agent are to be conducted. Those guidelines require the following:

1. The bank's recordkeeping system should produce daily reports showing securities available for lending and currently lent, outstanding loans by account, and the like.

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[16] 1-A Pens. & Profit Sharing (P-H) ¶ 21,615.

[17] The conditions require the following: The party must provide its most recent audited financial statement to the plan. The actual borrower of securities may not have discretionary authority or control over investment of the borrowed assets nor render investment advice concerning them. The loan must be made pursuant to a written agreement with terms at least as favorable as an arm's length transaction with others. Collateral with a value of at least 100 percent of the amount of the loan must be kept during its life, and collateral must be in the form of cash, Government securities or bank letters of credit. The borrower must pay the plan a reasonable fee, though it may be in the form of investment of the borrower's cash collateral. ¶ 21,625; Prohibited Transaction Exemption 81-6 (46 Fed. Reg. 7527 (Jan. 23, 1981), correction published 46 Fed. Reg. 10570 (Feb. 3, 1981)); Prohibited Transaction Exemption 82-63 (47 Fed. Reg. 14804 (Apr. 6, 1982)).

[18] F.R.R.S. ¶ 3-1579.5.

2. Collateral should be marked to market daily. Written procedures must outline how to choose the customer account that will be the source of lent securities when securities to be loaned are held in more than one account. Timeliness of reports and overall compliance with procedures must be audited.

3. A management committee should approve each borrower to whom securities are lent after credit review by someone other than a member of the security lending operation.

4. Management should establish individual credit limits for each borrower.

5. A collateral margin greater than 100 percent of loan value should be set on the basis of price volatility, and lent securities should not be released unless collateral is sent simultaneously.

6. Banks should have written guidelines on investment of cash collateral and obtain written authorizations from borrowers on such investments.

7. If letters of credit are accepted as collateral, the issuers of such letters and concentration limits should be reviewed.

8. Lending should be done only under written agreements with the owner of the securities and with the borrower outlining the bank's responsibilities and fees.

9. The bank's policy on the use of finders should be detailed in writing. Finders should never be permitted to take delivery of securities or collateral.

10. If the bank indemnifies lenders, written opinions of its counsel and accountants should be obtained concerning authority to indemnify and financial statement disclosure of the indemnity.

11. Loans and indemnities should be reported on the bank's Call Report.

Broker/dealers. The SEC restricts the conditions under which broker/dealers may engage in securities lending through Rule 15c3-3, its regulation requiring physical possession of all customer securities.[19] Any party other than another broker/dealer is

[19] 17 C.F.R. § 15c3-3 (1988).

considered to be a "customer" for purposes of this regulation. Accordingly, in order to permit broker/dealers to deliver borrowed securities to others, the regulation carries an exception.

The exception permits a broker/dealer not to have possession of securities borrowed from another party so long as a written agreement with the lender specifies (1) the rights and liabilities of the parties, (2) the right of the lender to receive a schedule of securities loaned at the time of the loan, (3) a notice that the transaction is not covered by the Securities Investor Protection Act of 1970, and (4) requirements that the broker/dealer (a) provide collateral in the form of cash, Treasury bills or notes or a letter of credit by the end of the day on which the loan occurs and (b) subsequently mark the collateral to market daily.[20] Recently, at the request of the PSA, the SEC has permitted certain Government securities other than notes and bills to serve as collateral.[21]

It should be noted that another SEC regulation restricts short sales, for which a great amount of securities borrowing is conducted. Short sales of non-government securities may be made only on an increase in a security's price, called an "up-tick."[22] The purpose of this rule is to allow relatively unrestricted short selling in advancing markets, prevent short selling at successively lower prices, thus eliminating short-selling as a tool for driving the market down, and prevent short sellers from accelerating a declining market.[23]

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[20] Id. at Section 15c3-3(b)(3).

[21] See letter to Michael A. Macchiaroli, Esq. Assistant Director, Division of Market Regulation, SEC, from Frances R. Bermanzohn, Esq. (June 21, 1988); Federal Register notice, 54 Fed. Reg. 10680 (Mar. 15, 1989); and the SEC's no-action letter, available Mar. 2, 1989. The notice permits certain mortgage-related securities and securities issued by the Financing Corporation to serve as collateral.

[22] Rule 10a-1, 17 C.F.R. § 240.10a-1 (1988). There are exceptions for specialists, market-makers and others.

[23] Securities Exchange Act Release No. 11468 (June 12, 1975), 40 Fed. Reg. 25443 (1975).

The Fed restricts securities borrowing and lending by broker/dealers in Regulation T, which generally imposes restrictions on the extent to which broker/dealers may obtain and extend credit.[24] The lending of securities is limited because broker/dealers could avoid the Regulation's restrictions on extensions of credit by engaging in such transactions; instead of lending funds to a customer, a broker/ dealer could lend securities, which the customer could then sell for funds and put himself in the same position as if he had borrowed funds from the broker/dealer.

The Regulation permits a broker/dealer to borrow or lend securities only for the purpose of making delivery in the case of short sales or failure to receive securities required to be delivered.[25] Also, such transactions must be secured, and collateral may be cash, government or agency securities, negotiable bank certificates of deposit and banker's acceptances issued in the United States, and letters of credit issued by United States banks and certain foreign banks; collateral must equal at least 100 percent of the market value of the securities borrowed and must be marked to market daily. The requirement of collateral puts a limit on the extent to which securities loans can provide leverage to market participants.[26] However, Fed staff has indicated that it is permissible for corporate securities and other non-qualifying securities to be used as collateral for a LOC. That is, non-qualifying securities may serve as collateral for the bank that issues an LOC that collateralizes a securities loan. It was

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[24] 12 C.F.R. Part 220 (1988).

[25] 12 C.F.R. § 220.16 (1988).

[26] The SEC had been opposed at one time to permitting the use of letters of credit as collateral because of concerns about leverage that the use of non-cash/non-securities collateral could provide. However, it appears that the great majority of banks require that such letters be collateralized, thereby reducing the leverage available through their use.

recognized that this would occur, but it was believed that the need to pay for the LOC would suffice to prevent abuse of this alternative.[27]

Fed staff has interpreted this provision strictly. It disallows borrowing by a broker/dealer prior to the need for the security for future short sales or failed deliveries; each loan must relate to an actual transaction that has already occurred or is about to occur.[28] It also disallows borrowing for purposes of so-called "dividend reinvestment plans."[29] It has also disallowed the use of Eurodollar certificates of deposit, which are issued and payable offshore, and unlisted corporate debt as collateral.[30] However, staff has not objected to the use of certain foreign sovereign debt securities as collateral for the borrowing of foreign corporate securities from the same nation.[31]

IV Market Participants

A. Introduction

Lenders of securities are usually pension funds, endowments (including college funds), life insurance companies (lending from their general investment accounts), or mutual funds. Securities firms may also lend to one another directly. The incentive to lend is fee

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[27] Use of margin stock as collateral for such an LOC raises the question whether the LOC itself constitutes an extension of credit covered by the margin regulations that apply to banks. Fed staff has indicated orally that it does not. Otherwise, margin stock would have to be provided in an amount sufficient to satisfy the margin regulations; using the 50 percent margin currently required by Regulation U, the market value of the margin stock would have to be double the amount of the LOC if staff indicated that the margin regulations applied.

[28] Federal Reserve Regulatory Service ("F.R.R.S.") ¶ 5-610. The F.R.R.S. carries Board and Board staff interpreta-tions and opinions.

[29] F.R.R.S. ¶¶ 5-615.01 and 5-615.1.

[30] F.R.R.S. ¶¶ 5-615.13 and 5-615.14.

[31] F.R.R.S. ¶ 5-615.15.

income with minimal risk to principal, properly managed. There are, roughly speaking, about 2,000 lenders.

Borrowers are typically securities firms who have positioning (covering shorts) or operational (avoiding fails) objectives. As a group, these firms have less risk aversion than lenders but also have narrower margins for error (reflecting their capital structures). The incentive to borrow securities would seem to increase with the volatility of the capital markets. One would, therefore, expect a large number of securities firms to be participating. This does not seem to be the case. One bank, considered to be among the top agents, has indicated that it will lend securities to 56 firms. These firms, however, account for the majority of the wholesale market activity.

Finally, agents are typically money center banks or trust companies with national clienteles. Regional banks have recently increased their securities lending activities, generally providing similar services to smaller pension funds and endowments.

There is occasionally a fourth party participating, a tri-party bank in a borrow program. Borrow programs account for a small, but growing, percentage of all securities loans.

The confluence of profit motivations of borrowers, lenders and agents can be seen in pricing. Securities loans have an explicit fee which is divided in some manner between the agent and lender. This fee is set by the agent through negotiations with the borrower; it usually reflects the market's demand for the security being lent, the rebate rate for cash collateral or the securities accepted as collateral, the level of collateral, and whether an indemnification is provided.

B. Lenders

The suppliers of securities for loan are primarily pension and endowment funds, but could be any investor with a sizable portfolio. The tax-exempt status of most lenders

appears to be largely coincidental, and accordingly, any change in the Federal taxation of employee benefit funds would seem to have little impact on this business. (Taxation may even be an incentive to lend to generate offsetting income.)

Generally speaking, lenders seek to improve the performance of their assets or to offset the cost of trustee and custodial services. The return on securities loans is about 0.5 percent per year on stocks and about half that on Treasury securities.[32] This fee income is small relative to investment returns over the past five years, but given the estimated $2.3 trillion in public and private (corporate) pension fund assets,[33] it represents a significant potential benefit to the group. That benefit, roughly estimated, could exceed $1 billion. A recent report indicates that among pension funds with assets of $1 billion or more, 71 percent had security lending programs in place.[34]

Although securities firms have lent stocks and bonds among themselves for many years, a concerted effort was made to attract institutional portfolios in the early 1970s. Competitive considerations made it unwise for one broker/ dealer to approach other broker/dealers for a securities loan, especially among the key players in the government securities market. In 1981, the U.S. Department of Labor gave pension funds permission to participate in securities lending arrangements, providing that certain collateralization, credit review and indemnification rules were followed. The initial response was enthusiastic. Northern Trust Company of Chicago and Chase Manhattan Bank of New York took an early lead in this

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[32] Victor F. Zonana, "L.A. County Halts Securities Loan Program, Pooled Fund Had Profited but Exposure After October 19 Crash Worried Treasurer", The Los Angeles Times, Nov. 16, 1987, Part IV, p. 1.

[33] Based upon year-end 1988 survey data, EBRI Issues Brief No. 91, Employee Benefits Research Insitute, Washington, D.C., June, 1989.

[34] Janet Lewis, "Pensions: Making Assets Work Harder," Institutional Investor, Feb. 1988, p. 113.

business, developing highly automated systems to support lending activity.[36] Other banks followed.

The failure of Drysdale Government Securities in 1982 sent a scare through the securities lending business due to the economic similarity of a reverse repurchase agreement and a securities loan with cash collateral. Pension funds backed away from lending temporarily, but returned as the character of their holdings changed and agents imposed tighter controls.

Even before the revelations of fraud and other misconduct in the repurchase agreement market, relatively few corporate pension funds were permitted under their plan provisions to "repo out" securities. (Virtually no public pension funds were permitted to do so.) These transactions were probably viewed by plan sponsors in a literal fashion, i.e. the sale today of certain securities and their repurchase at some later date. As such, the repurchase agreement had a speculative flavor. The Drysdale affair solidified this view. Even though the economic substance of a "repo out" was the same as that of a securities loan, securities lending was perceived to be less risky. This was probably related to the widespread practice of agents indemnifying plans for most losses arising out of the lending transaction.

Four factors thrust pension funds into dominance as lenders of securities. The first was their self-imposed restrictions on repo activity. Second, by the early 1980s pension funds had more securities in their portfolios that were desired by broker/dealers. This reflects the diversification brought about by the Employee Retirement Income Security Act of 1974 (ERISA). That landmark legislation placed large employee benefit plans under the supervision of the U.S. Department of Labor and sought to put them on a sounder financial footing by increasing the scope of their asset holdings. In the years before ERISA, most large pension plans had concentrations of fixed income investments and relatively minor exposures to the

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[36] Id.

equity and real estate markets. ERISA, the weak bond market of the late 1970s, and the 1982-83 rally in stocks gave pension funds the impetus to diversify. They did so in a manner that positioned them well for the later phases of the bull markets in stocks and bonds. Those bull markets swelled their asset holdings and gave pension funds the wherewithal to diversify further, into small-capitalization stocks, venture capital, foreign securities, real estate, etc. The core of the typical pension fund portfolio remained, however, large capitalization stocks and high-quality bonds. These were precisely the instruments sought by borrowers.

The third factor was income. Against the background of the dual bull markets, trustee banks "unbundled" their custodial and other charges. The surge in trading volume, and the increased diversity of holdings, had sharply increased their costs. These higher costs were frequently passed on to the pension funds via transaction-driven fee schedules, which could increase trustee/custodial charges by as much as one-third. Securities lending provided a means of offsetting those increased expenses. Endowments and foundations had similar experiences. In one reported case, a foundation selected a bank as its master trustee because its securities lending agreement promised to defray a significant portion of the trustee expense.[36]

Finally, ERISA focused attention on the total rate of return earned by a pension fund. The discharge of a pension fund officer's fiduciary responsibilities was to be evaluated on the basis of the fund's return and not that of each investment in the fund's portfolio. This enabled pension funds to invest in more risky media so long as other assets compensated for it. In practice, pension funds held large positions in government securities which enabled them to diversify into equities without fear of liability from occasional stock losses. Obviously, the

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[36] _____, "Joyce Foundation", Pensions & Investment Age, Oct.10, 1987, p. 24.

lending of those "anchor" securities enhanced total returns. This income stream also reduced the volatility of portfolio returns that attended the increasing concentration of equity holdings.[37]

The emphasis on total return performance was heightened by Financial Accounting Standard No. 87. The Standard required a comparison of the market value of invested assets to the present value of accrued liabilities. Pension funds with asset values below the present value of their liabilities were obliged to report the difference as an underfunded condition. This underfunded condition was, in turn, allocated over a number of years and reported as a "cost" on the parent corporation's financial statements. The Standard gave corporate managements an added incentive to assure that their pension funds were earning a competitive total return.

C. Borrowers

Borrowers as a group are the most homogeneous of parties to a securities loan transaction, consisting almost entirely of securities dealers. Other borrowers of securities would be "hedge" or aggressive trading accounts that take short positions, as well as individual investors.[38] Due to their relative importance, securities dealers are the dominant factor in the demand for securities loans.

Dealer transactions may be broadly classified as having either a position orientation or a financing orientation. Positioning transactions typically precede and drive a corresponding financing transaction. The two principal position transaction types are purchases and sales. Financing transaction types are more numerous, but for the present discussion,

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[37] Interestingly, it is not industry practice to include security lending income in the computations of an investment manager's total return.

[38] Individual borrowing typically takes place in equities, where they are most active, but is not seen as a significant source of overall activity.

consideration of three financing transaction types will be sufficient: RPs, RRPs, and securities loans (SLs).

Purchases. A dealer can purchase securities with either its own capital or it can use borrowed funds. Dealers borrow funds by entering a financing transaction. In the government securities market, the most popular way to borrow money is by executing an RP transaction. In this financing transaction dealers acquire funds to complete a purchase transaction, typically using the purchased security as collateral in the RP transaction. Thus, the coordinated execution of a positioning transaction (the purchase) and a financing transaction (the RP) provide the dealer with a leveraged ownership interest in the purchased security.

Sales. A dealer entering a sale transaction either sells a security it holds in inventory or executes a corresponding financing transaction through which it borrows the security it has sold short. Dealers in government securities may borrow securities through two types of financing transactions: the RRP or the SL. The choice between these two financing alternatives is a function of price, counterparty availability, and the supply of the desired collateral. As in the purchase case, use of a corresponding financing transaction results in a leveraged position (a leveraged short position).

Almost all government securities dealers run matched-books. Matched-books are a hybrid situation, in that two financing transactions are entered that result in a position. Matched-book positions can be established by either RP-RRP combinations or RP-SL combinations. Matched-books are probably the only instance where a dealer's financing transactions do not correspond to a positioning transaction, yet they may result in a position. Of course, a perfectly fitted matched-book trade results in an arbitrage profit rather than a position.

Loans. In general, securities loans can be viewed as one of several financing alternatives, which are usually entered in support of a positioning transaction. Specifically,

securities dealers select this financing transaction to either (1) cover short sales, or (2) reduce or eliminate fail-to-deliver exposures, or (3) as part of a matched-book trading strategy.

A dealer chooses securities loans as the most attractive financing alternative available, and may even sometimes view it as the only alternative. This usually means that the loan finances the position at least cost to the dealer. The loan may also be attractive to the borrower as a means for disguising its position from other dealers; however, cost is always a critical variable.

Dealers also utilize the loan market to obtain special issues because of supply levels and the benefits of secrecy in specials dealing. Dealers may also lower their ultimate financing cost by negotiating a rate on a large block with one lender versus accumulating securities from many through RRPs. By working with lenders outside the dealer community, dealers can often hide their positions and avoid unfriendly manipulation by other dealers.

Another use of the securities loan, most prevalent in the equities market, is to use the borrowed security to satisfy an obligation arising out of a written call option that expires in-the-money. The dealer borrows the security in the hope that it will fall in price. While this usage was mentioned by a participant as a separate activity, it can be alternatively viewed as a special case of using a borrowed security to cover a short sale, as a short unhedged in-the-money call option leaves the dealer with a short position at expiration.

A very important ramification of securities lending is its general downward pressure on dealer financing costs. The existence and growth of lending serve to lower dealer financing costs by increasing the supply of securities for such financing. Evidence for this effect is widespread, but is perhaps captured best by the recent decline in the typical fee paid by

borrowers in the borrow v. pledge transaction.[39] The decrease in this fee reflects a relative increase in the supply of securities available for loan.

D. Agents

An agent in the securities lending business may be anyone authorized to engage in the securities business who acts as an intermediary between a borrower and a lender of securities. In practice it appears that only banks and broker/dealers perform this role. However, broker/dealers may borrow customer securities in order to engage in short selling and to make good on failed deliveries as principals rather than as agents; as a legal matter, they act as principals in borrowing from their customers, or lending to them, and accordingly should not be considered to be agents. Banks, then, appear to dominate the agent function in the securities lending process.[40]

Many banks act as custodians of securities for their customers. These customers are broker/dealers and institutional investors such as insurance companies, pension funds and the like. Some banks have found that, as part of their custodial services to non-broker/dealers, they can attract business by offering to lend the customers' securities for them and thereby generate additional income on those portfolios. The banks may also obtain additional funds for their money desks by receiving cash collateral from borrowers of customer securities and investing it; typically the banks retain a portion of the income earned on such investments. While some agent business is on a stand-alone basis -- that is, the bank is not custodian of the customer's securities that the customer makes available for lending by the bank -- it appears that the great majority is derived from securities held by the bank.

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[39] Formerly 50 basis points, this fee is now typically quoted at 25-30 basis points.

[40] Brokers' brokers perform a significant agency function in the closely related RRP market, and participate as agents on a much more modest scale in the securities lending market.

Acting as agent in a securities lending transaction appears to require, at minimum, a sophisticated understanding of the risks involved in such transactions, the trust of lenders who are relying on the agent's expertise in arranging the transactions, and a supply of securities available virtually immediately for transactions. These requirements by themselves establish a very high threshold of entry into the business; it appears that only the largest banks with a securities custody presence in New York have met it.

A new environmental factor that may cause current agent banks to decide to drop out of the market is the Risk-Based Capital Adequacy Guidelines. Those Guidelines for the first time will require a specific amount of capital to support off-balance sheet items. All of the agent banks that discussed the matter indicated that they provide their custody customers with some form of indemnity covering the failure of the borrower to return the lent securities. The Guidelines specifically include indemnities against loss on securities loans as a direct credit substitute.[41] This means that the amount of the indemnity is translated at full value to a balance sheet equivalent amount.[42] If the borrower is a private party that is not a bank -- that is, the borrower is not a bank or a Federal or municipal governmental entity -- and the collateral is not

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[41] The Risk-Based Guidelines state the following:

> Securities lent by a bank are treated in one of two ways, depending upon whether the lender is at risk of loss. If a bank, as agent for a customer, lends the customer's securities and does not indemnify the customer against loss, then the transaction is excluded from the risk-based capital calculation. If, alternatively, a bank lends its own securities or, acting as agent for a customer, lends the customer's securities and indemnifies the customer against loss, the transaction is converted at 100 percent and assigned to the risk weight category appropriate to the obligor, to any collateral delivered to the lending bank, or, if applicable, to the independent custodian acting on the lender's behalf.

Risk-Based Capital Guidelines, 54 Fed. Reg. 4186, 4202 (Jan. 27, 1989).

[42] That is, the full amount of the indemnity is multiplied by 100 percent to translate the off-balance sheet item to the balance sheet. This means that the amount of the indemnity is treated as though it were a balance sheet liability. The riskiness of that "liability" is then based upon the risk category of the borrower or of the collateral provided by the borrower. Risk-Based Capital Guidelines of State Member Banks, 54 Fed. Reg. 4186, 4204 (Jan. 27, 1989).

cash, government securities or a LOC, then the liability is in the highest category of risk, which is 100 percent. If the borrower is a governmental instrumentality or a bank, or if the loan is fully collateralized with cash or government securities or is backed by a LOC, then the liability is in a lower risk category, 20 percent; that is, 20 percent of the value of the loan is a risk-weighted asset.

The banks with which discussions were held on their indemnities prior to the new Guidelines stated that they do not currently report such indemnities on their Call Reports. The explicit statement in the Guidelines makes clear that they are to be reported and that capital will be expected by the regulators to support them. Upon the full phase-in of the Guidelines in 1992, such indemnities will attract a minimum capital requirement of 20 percent of eight percent of the indemnified amount on a risk-weighted basis, or 1.6 percent. Because securities loans are required by the Fed to be collateralized by cash, government securities or a LOC, and, as noted above, practice is to require such collateral, such collateral or LOC will place the indemnity in the 20 percent risk category.

Assuming the agent banks pass this capital cost through to their customers, the cost of the business will increase and may cause either lenders or agent banks to pull out of the business. Alternatively, banks could reduce the fee income paid to lenders that wish to have the protection of an indemnity. Another alternative would be for agent banks to attempt to pass this cost through to borrowers; however, it is not clear whether the agented portion of the securities lending market would be strong enough in relation to the non-agented portion to make such an action effective.

Because agent banks' activity derives from their securities custody activities, it appears that the primary determinant of an agent's market share is the amount and type of securities that it holds for customers. A bank holding a large amount of government securities would be in a very good position to enter this market; one holding primarily corporate debt and

equity would be in a good position, but probably not as good as one holding governments inasmuch as the latter are more liquid and thus more actively borrowed. Beyond this, other determinants of market share would appear to be (1) the nature of the bank's custody customers, (2) the attractiveness of the bank's pricing to lenders, and (3) the bank's visibility among securities borrowers and the attractiveness of its prices to them.

It appears that securities lending by agent banks is growing, but not exponentially. In the absence of statistical data, it is extremely difficult to discern precise trends. Agents believe that the lending of foreign securities is increasing, and, with the growing internationalization of securities markets, it may be that domestic institutional investors will hold more foreign securities and increase the supply available for lending. This is discussed below in Appendix A.

V Risks Borne by Each Participant

A. Lenders

There are three sources of uncertainty for the lender:

1. The scope of the indemnification.
2. The creditworthiness of the agent providing the indemnification.
3. Interference with the investment process.

Pension fund trustees and officers are burdened by their fiduciary responsibility to plan participants. They are also subject to standards of performance defined by the U.S. Department of Labor under ERISA. Against this background, pension funds frequently require some form of indemnification from the agent for non-performance by the borrower and certain other events. (Similar provisions attend the lending of assets by endowments and foundations.) Pension funds can, however, enter into lending agreements which do not provide for such

indemnification. Compensating controls would probably be imposed upon the agent in those cases. Such controls might include a more selective list of borrowers, dollar limitations on the exposure to any one borrower and to the fund as a whole, and possibly, stiffer collateralization requirements (quality and level). As one borrower emphasized in an interview with the authors, there is little need for an indemnification if the business is done properly, pointing out the smooth functioning of the securities lending market during the stock market crash of October, 1987 as indicative of the industry's soundness.

Although securities lending agreements have achieved some degree of standardization, indemnification provisions differ. Most provisions state that the failure of a borrower to redeliver securities or remit distributions will trigger indemnification. In effect, the agent is assuming the credit risk of a borrower default. On the other hand, specificity with respect to trigger events is usually lacking. In addition, if the borrower's failure to return securities is caused by the agent's failure to return collateral, no indemnification may be indicated. Accordingly, the scope of indemnification may be unclear, especially in the wake of an unusual market movement or the failure of one of the computer-based systems supporting securities/funds transfer.

The Drysdale affair sensitized pension funds to the obligations of counterparties in these transactions. Few funds seem to take comfort in the explanation that securities loans are risk-free by virtue of their collateralization. The benefit of an indemnification provision and its implicit cost are considerations for lenders in what is essentially a business decision. The greater degree of comfort with a given agent's selection of borrowers and with its collateral controls, the lesser the net benefit of an indemnification. Agents continue, however, to treat the indemnification as something incidental to the securities lending arrangement. Banking Circular

No. 196 (from the Office of the Comptroller of the Currency) acknowledges that indemnification is commonly provided as part of the primary service of securities lending.[43]

In volatile capital markets, lenders must rely upon the agent's ability to manage the flow of securities to and from borrowers in a manner that does not interfere with the execution of their investment policies. In one reported instance, a major West Coast bank implemented a trust accounting system that caused disruption to its securities lending, portfolio analysis, benefits disbursement and participant recordkeeping businesses.[44] Although developments of this sort frequently are unreported, "back office" efficiency is a recurring theme in lender commentaries: When one major pension fund selected a regional bank to implement its securities lending program, the pension officer remarked that "Securities lending is a system-type operation and you must feel comfortable with the system being used at the bank."[45]

The increasing complexity of financial instruments and the proliferation of special dividends from corporate reorganizations place a special burden upon agents. The cash flows from these sources, if misdirected, could adversely impact investment returns. They could also misstate performance results and, by so doing, impact decisions as to the hiring or firing of investment managers. Finally, the lender may also be exposed to a loss of value if "equivalent securities" have to be purchased by the agent to extinguish a loan obligation under an indemnification provision.

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[43] The same Circular calls for extensive prudential controls on the activity, including the credit analysis of borrowers and the maintenance of adequate collateral.

[44] M. A. Robinson, "BankAmerica is Computing More Trouble; New High-Tech System Plagued with Backlogs", American Banker, July 16, 1987, p. 1.

[45] _____, "Late News", Pensions & Investment Age, September 21, 1987, p. 54.

B. Borrowers.

From the borrower's perspective, the availability and retention of loaned securities are seen as a source of value. Yet, most securities loans are arranged with open maturity terms. This allows the lender to manage the portfolio without regard to lending activity. Given the lender's strong preference for portfolio liquidity, securities loans rarely involve any type of term lending. Most loans are entered with open maturities and repriced daily. The term loans that are entered usually have a substitution clause, which allows either party to change the loaned security during the loan term. All substitutions are subject to repricing, but most often these repricings penalize the substituting party. In sum, the overriding concern in structuring the maturity of a securities loan is to ensure that loan involvement remains transparent to the lender in his purchase and sale decisions.[46]

C. Agents.

Agents, as the "middle-men" between borrowers and lenders, subject themselves to fewer types of risk of loss than do borrowers and lenders. The primary risk of agents seems to be in the indemnity undertaken by most banks that engage in this business. Other risks, which appear to be of a much lower degree of concern, are incurred in their agreements to perform services for lenders.

As noted above, the new Risk-Based Capital Guidelines state that a bank's indemnity of a lender of securities constitutes a financial guarantee, which means that the full value of the guarantee is treated as a balance sheet claim against the borrower. While the Guidelines do not themselves cause indemnities to be any riskier than before, they will probably highlight for banks the nature of their particular indemnities and may motivate changes in their

[46] Term lending is most likely to occur when a lender has a large supply of a particular issue, as the lender can put a portion of the issue out on term loan and lend the majority of its holdings in this same issue on an open basis.

scope. For example, a blanket indemnity against loss on a securities loan by a lender would seem to constitute an indemnity for the full value of the lent securities. More specific indemnities would cover discrete risks that would limit the amount for which the bank is placed at risk. For example, one bank indemnifies its lenders against risk of re-delivery failure and risk of failure to receive any dividend or interest payments made by the lent securities' issuer that are to be paid to the lender during the term of the loan; it does not cover the risk of failure to re-deliver lent securities if that failure is caused by the bank's inability to return cash collateral due to failure to receive payment on any transaction in which cash collateral has been invested. It appears that this indemnity would be considered to cover the full value of the lent securities. Banks might attempt to limit the amount of the indemnity to some lower amount, such as a percentage of the value of the lent securities, perhaps based on the theory that a lender will be willing to assume risk of return of cash collateral and to accept an indemnity only for a small percentage of the lent securities' value in order to cover some amount of exposure due to market price movements. It seems that an indemnity limited in amount would permit the bank to report only that amount as an off-balance-sheet item for capital purposes.

There are other aspects of agent activities that expose the agent to risk:

1. As noted above, agents receive some of their compensation from the investment of cash collateral; most of those earnings are returned to borrowers, but the agent keeps a specified portion. An agent incurs the risk that it will not receive the return that it expects and thus will have lower income.

2. Agents may incur loss in the transmission of lent securities and/or the receipt of collateral. It appears that, at least in the domestic securities market, this risk is minimal. Some banks will lend only "wireable" securities -- that is, governments in book-entry form or securities deposited at Depository Trust Company -- which lowers this risk substantially. The lending of foreign securities arranged in the United States presents a more complicated picture because re-delivery of lent securities almost always occurs in a foreign country while the cash collateral is almost always in dollars that must be paid in the United States; there are almost always time zone differences between the United States and the country in which re-

delivery of the securities takes place, which exposes the parties to risk during the interval between the exchange of securities and cash.[47]

3. Agents assume the responsibility of marking collateral to market and obtaining additional collateral speedily when needed. Failure to carry out this responsibility opens the agent to a claim for negligence by the lender if loss results.

4. Many agents set limits on the level of borrowings that may be outstanding from that agent's lenders to each borrower and the level of loans for different classes of securities that it will permit. This practice may be intended primarily to protect the bank from risk of loss on its indemnity, and secondarily to provide some comfort to its lenders that the agent is acting to limit its lenders' exposures.

VI Pricing Securities Loans

The cost or price of a securities loan is largely, but not completely, independent of the loan's transaction type.[48] The pricing of securities loans must be viewed in the context of the RP-RRP market. In fact, prices that are established in the RP-RRP market are used as a benchmark for setting the fee in the borrow v. pledge agreement.

The discussion of pricing that follows will begin with a detailed description of how the borrow v. pledge fee is actually set in the RP-RRP market. This explanation will be followed by a description of how the "rebate" rate of the borrow v. cash transaction is set in the RRP market. Finally, a summary discussion of pricing will show how these two pricing approaches can be applied to the pricing of the borrow v. LOC and the borrow program transaction types.

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[47] Some lenders have indicated to broker/dealers that they wish to receive dollar cash collateral on the day before delivery of foreign securities is to be made and will pay interest overnight on those funds. To the extent that borrowers accede to this demand, borrowers are exposed to the risk of delivery failure the next day. Upon repayment, securities are delivered prior to delivery of cash collateral, for the protection of the lender; however, for European securities the cash and securities are delivered on the same day but with several hours' difference. Also, it should be noted that the concerns discussed in the text do not apply to securities lending arrangements established by foreign securities clearance and settlement systems such as Euro-clear and Cedel.

[48] For expositional ease, the pricing section will focus on government lending practices and ignore pricing issues for loans of other securities.

One way to look at the pricing of a reverse repo, in order to compare it with the pricing of a securities loan, is to think of securities borrowing via reverse repo as involving two repurchase transactions. In the first repo, the dealer borrows cash and puts up securities it has, but does not need, as collateral. The second is a reverse repo in which the dealer lends out the cash it has "repoed in" and receives as collateral the securities it seeks to borrow. A spread exists between the repo rate on the first transaction and the reverse repo rate on the second transaction. The repo rate (which the dealer pays to borrow cash) is higher than the reverse repo rate (which the dealer earns by lending cash). The spread exists because in the repo transaction the counterparty (who lends the dealer cash) is willing to accept any one of several possible types of securities as collateral. For this flexibility, the counterparty receives a higher interest rate. By contrast, in the reverse repo transaction the counterparty (who borrows cash from the dealer) is required by the dealer to put up a specific type of security (i.e., a special) as collateral. The counterparty in the reverse repo thus obtains a lower interest rate in exchange for abiding by the dealer's strict collateral terms.

To illustrate how RPs and RRPs can be used to construct a securities loan, assume the dealer currently possesses T-notes but wants to borrow T-bills to cover a short position. The first transaction is a repo in which the dealer borrows cash and puts up its T-notes as collateral. The second transaction is a reverse repo in which the dealer lends the cash it obtained via the repo and takes in the desired T-bills as collateral for the cash loan. On balance, the dealer must pay for obtaining the T-bills. This cost arises because of the difference in collateral in the two agreements. In the repo, where the counterparty is willing to accept almost any form of security as collateral, the dealer pays a relatively higher interest rate, say 7 percent, on the cash loan. In the reverse repo agreement, the dealer lends out the cash it has repoed in, but it is not flexible about the type of securities that the counterparty (a borrower of cash) puts up as collateral. Since the dealer must borrow T-bills, it requires the borrower of

cash to put up T-bills as collateral. This requirement restricts the universe of eligible borrowers and, therefore, forces the dealer to charge a lower interest rate, say 6.5 percent, on the cash it reverses out. The net effect is that the dealer receives the desired securities at a cost of 50 basis points (7.00% - 6.50% = 0.50%). Generally, a dealer can obtain the desired securities through the RP market, with the cost being a function of the spread between RP rates for general collateral and RRP rates for the desired security.

In financing their positions, dealers find a trade-off between (1) how flexible a lender of cash can be about the type of securities put up as collateral, and (2) the interest rate that the lender charges. The more inflexible the cash lender is about the type of securities put up as collateral, the more flexible he must be about the interest rate he charges. If a lender aims to borrow a specific type of security by lending cash to a borrower with that security, the borrower will be able to negotiate a lower interest rate on the cash loan. The reason for this trade-off is that when a cash lender is particular about the type of securities offered as collateral, he is limiting the number of potential counterparties who can borrow from him. Furthermore, if the cash lender seeks a special, he may have to accept an even lower interest rate. Thus, what might be a normal 50 basis-point spread between RP and RRP rates may become a 300 basis-point spread. In the extreme (a short squeeze in the desired security), this spread can become very large as RRP rates have fallen to zero and occasionally to slightly negative in the past.

Securities loans use the RP-RRP interest rate spread as a pricing benchmark, with the stability of this interaction dependent upon dealer sensitivity to funding costs. Since dealers can obtain the desired security by either using the RP-RRP strategy described above or through a securities loan, the dealer will normally choose the cheapest method between these two financing alternatives. Differences in the benchmark pricing spread and the securities loan fee may arise, but should only be temporary as dealers ultimately seek the lowest cost financing alternative. As a result of the dealers demanding the lower cost financing alternative, its price

should rise, quickly achieving equilibrium in a market as liquid as the government securities market.

The pricing of the borrow v. cash is also a function of pricing in the RP-RRP market. In this transaction type, lenders pay borrowers a fluctuating rate known as a "rebate". This rebate decreases as the desired security becomes scarcer; the rebate rate is typically the RRP rate of the security sought.[49]

In a borrow v. cash, gross earnings for the lender and its agent are calculated using the following formula:[50]

Gross Earnings = Earned Money Market Rate - Borrower Rebate

From this equation it can be seen that there are two ways to improve gross earnings: (1) by finding higher yields in the money market, or (2) by decreasing the rebate paid to the dealer (securities borrower).

The earned money market rate is the rate earned on cash collateral reinvested in the money market. The borrower rebate is the payment made to the borrower by the lender, and can be viewed as an interest payment on the borrower's cash collateral. The rebate rate is a function of the scarcity of the loaned security, rather than a function of money market rates. For scarce securities or specials, the borrower will accept a smaller rebate. In general, the RRP rate becomes the benchmark for the rebate rate, as it describes the market price for the sought collateral.

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[49] The economics of a RRP and a borrow v. pledge are the same, except that RP/RRP rates are on dollar proceeds and the borrow v. pledge fee is based on the par amount of the loan.

[50] Gross earnings are conventionally split 50/50 between the lender and the lender's agent. Lenders typically employ agents when entering securities loans.

An aggressive lender may set its rebate rate above the corresponding RRP rate to induce a dealer to borrow instead of arranging an RRP. However, such inducements are not typically necessary and would tend to be small as the dealer often prefers the securities loan to the RRP for proprietary positioning. Such inducements would be more common in lending collateral which is not scarce or if many lenders are in the market. Conversely, if circumstances cause lenders to pull back, dealers may be willing to give pricing concessions themselves, by accepting a lower rebate. Dealers may also accept a lower rebate to increase the term of the loan, although this rarely occurs in practice as lenders have a strong aversion to term loans.

In general, the RRP rate is the logical starting point for setting the borrower's rebate. Deviations in the "rebate" rate from the RRP rate must be understood as inducements by either the lender or borrower rather than fundamental pricing disparities.

Having established conceptual frameworks for pricing borrow v. pledge and borrow v. cash securities loan types, brief extensions can be drawn to explain the pricing behavior of the borrower v. LOC and borrow program transaction types.

The pricing of the fee in the borrow v. LOC transaction type is drawn directly from the benchmark pricing fee used in the borrow v. pledge arrangement. The fee charged in the borrow v. LOC can be viewed as the borrow v. pledge fee minus a concession for the credit enhancement provided by the LOC bank. The lender accepts a slightly lower fee in this transaction type in recognition of the cost of the LOC and the credit enhancement provided by the LOC bank.

Of the four transaction types the borrow program is unique in that its price is <u>not</u> transactionally driven. In a borrow program, the borrower and lender negotiate a fixed loan fee based upon the perceived lending value of the portfolio.[51] Setting the fee is a matter of

[51] The duration of borrow programs is certainly negotiable, but annual agreements are clearly the norm.

judgment. Some of the key elements upon which this judgment is based are (1) the nature of the securities typically available for loan in the portfolio, (2) the lender's past earnings experience, and (3) the dealer's demand for this transaction type. Other pricing considerations in this transaction are the potential absence of the lender's agent (no fee splitting), the increased credit risk of lending either an entire portfolio or a large subset of a portfolio to one borrower, and the generally reduced quality of collateral pledged by the borrower under such programs.[52]

A subtle risk to the borrower in this transaction is the risk of portfolio turnover by the lender. Under these programs lenders are free to fully change the nature of their portfolio. While such changes can either increase or decrease the value of the portfolio as a lendable asset, only the borrower is exposed to changes in the portfolio's lending value as the lender's fee has already been fixed. This risk to the borrower is somewhat mitigated by the fact that valued lending securities often appreciate in price and would accordingly be sought and held by the lender in managing the portfolio. In sum, portfolio management tends to complement rather than conflict with the borrower's needs; but it is worth remembering that the borrower alone bears the risk of portfolio turnover.

Summary of Pricing

The cost of securities lending transactions is based on the prices discovered in the RP-RRP market. Cost differentials may arise for many reasons. For instance, it may be more expensive to borrow from non-dealers such as insurance companies or commercial banks

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[52] This transaction type is popular for dealers seeking to borrow mortgage-backed securities, because of the segmented nature of the mortgage market. Borrowers may also pledge illiquid mortgages securities, such as whole loans, in this transaction type.

than from other dealers; when a borrower is willing to pay a fee to "hide its positions" from other dealers.[53]

While other dealers are an ongoing source of securities, the problem with borrowing from other dealers is that the dealer community is small and a dealer-lender may learn of the borrower's short position. For example, if dealer A borrows a large amount of T-notes from dealer B, dealer B may realize that dealer A has sold the note short. The individuals at dealer B responsible for the lending transaction could inform their traders of dealer A's short position. The traders could then influence the cost which dealer A faces when it closes its short position. Thus, dealer A prefers to borrow from insurance companies or banks so that it can hide its position. This preference may mean that dealer A has to pay a higher fee to borrow than it would pay if it borrowed from another dealer through a RRP.

Except for government issues close to maturity, the older a security gets, the less attractive it is to borrow. Market participants prefer newer securities as they offer greater liquidity. These newer securities are referred to as "on-the-run" and are typically more expensive to borrow. Suppose that the issue a dealer seeks is of this class. In a reverse repo, the effective borrowing fee the dealer faces rises from 25-30 basis points to several hundred basis points.[54] This would mean that the dealer incurs a net interest cost of several hundred basis points instead of the typical[55] 25-30 basis points.

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[53] Some would maintain that all cost differentials are supply and demand driven, with borrower demand for a particular issue explaining pricing premiums and an over-supply of lenders explaining discount situations.

[54] The rise in the borrowing fee is theoretically unlimited. In practice the fee rarely exceeds the RP rate on general collateral.

[55] In general, as interest rates fall, the spread between short term rates and the overnight or repo rate contract. Alternatively, the spread expands as interest rates rise. Moreover, this spread helps the define the 'typical' fee on a securities loan. Accordingly, securities loan fees tend to fall when interest rates fall and rise when interest rates rise.

The general point, then, about pricing is that the price paid by the borrower to engage in a securities loan does not depend on the transaction type used. Rather, prices are more dependent on the type of lender and, principally, on the type and supply of security borrowed. The scarcer the security, the higher the price of the loan.

VII Legal Issues

A. Status as contracts.

The loan of securities is governed by contract. There appear to be no general provisions of law governing the lending and borrowing of securities. Thus, the parties may define the scope of their rights and responsibilities within the contract between them.

There are relatively few court cases concerning securities loans, and those that exist deal with tax issues related to such loans rather than defaults in repayment. The seminal case defining the general terms of securities loans is Provost v. United States,[56] a 1926 Supreme Court decision that involved a Federal tax statute requiring payment of a tax on "all sales, or agreements to sell . . . or transfers of legal title to shares or certificates of stock." A securities firm claimed that the tax should not apply to the borrowing of a security in order to cover a short sale and the subsequent transfer of stock to the lender in order to repay the loan. Its counsel argued that the loan did not involve the transfer of legal title to the securities but rather was in the nature of a pledge of the securities. In language that remains applicable to securities loans, the Court said that borrowers own borrowed securities outright.[57] The Court held that legal title had been transferred and the tax was applicable to the loan and repayment of the securities.

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[56] 269 U.S. 443, 70 L.Ed. 352, 46 S. Ct. 152 (1926).

[57] See Appendix C. for the text of the relevant portion of the Court's decision.

After the date of the transactions Congress amended the statute to exempt from its terms "mere loans of stock" and "the return of stock so loaned."[58]

The other court decisions have dealt with the deductibility by a short seller of payments to lenders during the loan terms of amounts equal to dividends on securities that he has borrowed. Provost noted that this is a common feature of securities loans. Some courts held that such payments are the equivalent of interest on a loan and thus are deductible, while others held that such payments are part of the cost of acquiring the securities and should be treated as an adjustment to the cost basis, and thus not deductible until the underlying transaction is unwound.[59]

As contractual undertakings, the rights and responsibilities of borrowers and lenders are set forth in their contracts. While there are some differences in details among the provisions of contracts used by several major parties in such transactions, the general terms are the same.

B. Contractual provisions.

Broker/dealers and agent banks that do a significant amount of lending business have standing contracts with lenders and borrowers covering securities loans. Such agreements

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[58] See Founders General Co. v. Hoey, 300 U.S. 268, 273 (1937).

[59] In favor of deductibility: C.I.R. v. Wilson, 163 F.2d 680 (9th Cir. 1947), cert. denied, 322 U.S. 842, 68 S. Ct. 263 (1947); Main Line Distributors, Inc. v. C.I.R., 321 F.2d 562 (6th Cir. 1963); C.I.R. v. Wiesler, 616 F.2d 997 (6th Cir. 1947); Dart v. C.I.R., 74 F.2d 845 (4th Cir. 1935) ("The expenditure is one made solely for the purpose of continuing to hold the borrowed stock and is not an incident to ownership but an expense paid in order to maintain the taxpayer's position in the market with respect to that particular transaction." Id. at 847). Against deductibility: C.I.R. v. Levis' Estate, 127 F.2d 796 (2d Cir. 1942) ("Upon a short sale no gain or loss can be realized by the seller until the transaction is closed by a covering purchase. . . . What is paid to the lender for use of the borrowed stock should be regarded as an expense of selling and an offset against the price received, as truly as is a selling commission paid to the broker." Id. at 797); Helvering v. Wilmington Trust Co., 124 F.2d 156 (3d Cir. 1941), rev'd on other grounds, 316 U.S. 164, 62 S. Ct. 984, 86 L.Ed. 1352 (1943).

usually provide for the types of securities that may be borrowed from time to time and other matters related to fees, collateral and other arrangements.

Generally, securities lending agreements provide that loans are repayable upon demand. However, the contracts generally provide that demand be given with prior notice of some number of days so that the borrower can arrange for repayment. For government securities, demand typically requires one or two days notice. For corporate securities, demand requires five business days notice, due to the five-day period required for settlement of purchases; this means that the borrower must enter an order to purchase the borrowed security on the day that demand is made. Borrowers, on the other hand, may terminate their loans simply by returning the security to the lender, or by giving one day's notice of return and then returning it the next business day. Fees are usually payable upon maturity of the loan, though in many cases fees are paid monthly.

As would be expected from the purposes for securities loans, and from the language of the Provost decision, the contracts provide that the borrower may use the borrowed securities in any legal manner. Thus, the borrower may transfer the securities to other parties. Also, most contracts apparently provide that the lender is not lending securities of an ERISA plan; this is probably due to the restrictions imposed on ERISA securities loans, discussed above at Section III.C. above, arranged by parties in interest with the plan and the possibility that a borrower might become embroiled in disputes over compliance with those regulations. The contracts usually provide that the same security must be returned as was lent, though "equivalent" securities may be returned in certain circumstances.

The type of collateral that the lender will accept is stated in the contract. Borrowers are expected to use their best efforts to deliver collateral simultaneously with delivery of the loaned securities, but delivery may be as late as the end of the day on which the loaned securities are delivered. Treasuries are delivered against payment over the book-entry system

in virtually all cases. The amount of cash or value of non-cash collateral is specified in terms of the market or par value of the loaned securities. The value of securities, either loaned or used as collateral, is based on last sale prices or in the discretion of the lender's agent. These values are marked to market each day and the undervalue or excess delivered to the appropriate party. Usually the maintenance value is 100 percent of the loaned securities' market value, after initial value of between 102 and 105 percent. Cash or non-cash distributions on non-cash collateral belong to the borrower, with delivery of such distributions required either immediately upon receipt or upon unwinding of the loan. Cash collateral may be invested by the agent bank for the lender, and usually the agent or lender may commingle the collateral with its own assets; agent banks are often permitted by the contract to invest the collateral in their own certificates of deposit.

As noted above at Section V.C., agent banks generally provide indemnities to lenders against failure of the borrower to return the borrowed securities. The provisions vary in the actions that the agent may take to fulfill this obligation; in some cases it must liquidate non-cash collateral and remit the proceeds, plus additional cash in order to equal the market value of the loaned securities and any distributions due, while in others the agent may either return equivalent securities or the market value of the loaned securities plus distributions due. The contracts are generally silent on the time period that the agent bank has to provide payment on indemnification. There is some anecdotal evidence that banks are feeling pressure to do away with their indemnity because of the effect of Risk-Based Capital Guidelines. Whether this will result in reduced numbers of banks willing to give indemnities, or the fading away of indemnities generally, waits to be seen.

C. Bankruptcy of borrower.

An important issue that arises in connection with securities loans are the actions that the lender may take if the borrower is placed in bankruptcy proceedings.

The United States Bankruptcy Code provides that an automatic stay of proceedings against the assets of a person against which a bankruptcy petition has been filed applies to assets in the possession of the person's creditor.[60] This generally means that a lender may not foreclose on the borrower's collateral until a court so permits, which can take a significant amount of time and which thereby exposes the lender to market risk on the collateral and to possible liquidity problems due to its inability to deal with the collateral. Because of the problems that this provision may cause for financial markets, there is an exception for collateral held by a "financial institution" in connection with a "securities contract."[61]

While no court case has interpreted this provision, it seems clear that a securities loan would be considered to be a "securities contract."[62] Also, it seems clear that any commercial bank is a "financial institution," and also that, somewhat surprisingly, any custody customer of a bank that acted as agent in a securities loan is defined as a "financial institution."[63] Thus, loans by banks and by banks as agent for custody customers would seem to be exempt from the automatic stay, which would provide them with the legal ability to dispose of the collateral promptly in the event of default on a securities loan in the event of a bankruptcy petition. However, this conclusion remains untested in the courts.

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[60] 11 U.S.C. § 362(a) (West 1979 and Supp. 1988).

[61] Id. at § 362(b)(6).

[62] Id. at § 741(7) ("'[S]ecurities contract' means contract for the purchase, sale, or loan of a security. . . .").

[63] Id. at § 101(20) ("'[F]inancial institution' means a person that is a commercial or savings bank . . . and, when any such person is acting as agent or custodian for a customer in connection with a securities contract . . . such customer.").

APPENDICES

Appendix A. Global Lending

Corporate pension funds, under the impetus of Federal legislation and with added liquidity from rising stock and bond markets, restructured their portfolios in the early 1980s. This diversification included the purchase of foreign securities. Public pension systems followed their corporate brethren, albeit at a somewhat slower pace. The result was a substantial supply of potentially loanable securities, mostly Japanese equities. Custom and regulation constrained many foreign institutions from lending securities in their own markets. As those markets grew, and became more internationalized, the demand for such loans also grew. American banks and pension funds found themselves postured to satisfy that demand and earn handsome fees by doing so.

Loans of foreign equities in their home markets can earn up to 300 basis points (net of transaction costs) on the face value of securities lent; this usually being split between the pension fund and its agent bank. By way of comparison, domestic securities loans generally earn from 30 to 100 basis points. One could reasonably argue that the higher fees from offshore activities reflect the greater risks borne by the agent and to a lesser extent, the lender (as discussed below). A recent article in Pensions & Investment Age reports that five global custody banks offered this service at year-end 1988: Bankers Trust Company, NY; Boston Safe Deposit & Trust Co., Boston; Chase Manhattan Bank, NY; Northern Trust Co., Chicago; and Harris Trust Company, Chicago.[1] These, and other banks now providing the service, allow

[1] Marlene Givant Star, "Global lending gathering speed", Pensions & Investment Age, Oct. 17, 1988, p. 60.

institutional investors to lend their securities overseas without having to run the complicated process in-house, although a few, large lenders are moving in that direction. From the agent's perspective, spreads on domestic securities loans have narrowed as the business has matured. These narrower spreads, according to a recent article in American Banker,[2] have pushed the major agent banks to look to foreign markets for enhanced profits.

The Financial Times reported that speakers at a February 4-5, 1988 conference on securities lending complained about a shortage of borrowable international stock.[3] The Times observed that many pension funds were overweighted in equities relative to their historical norms. Because of this demand, and for borrowable international stock, those funds could boost income. This cash flow would in turn reduce the risks attending their overall equity positions. Rough estimates of overseas securities lending indicate daily average outstandings of about $3 billion in Europe (including Euro-Clear and CEDEL) and about the same amount in Japan.

The wider global spreads may be attributable to a lack of competition in those markets, or a greater degree of riskiness, or both. In the latter regard, there appear to be five sources of risk in global lending: First, such loans now involve physical securities and this exposes the agent and borrower to intra-day settlement risk. For a Japanese loan, the securities are delivered in Tokyo and the collateral is delivered in New York. Although each party accepts intra-day risk on one side of the transaction, there is not necessarily a complete offset. This risk is lessened if a book-entry system is used. Second, the collateral is typically the local currency which is usually converted into dollars (i.e., exchange rate risk) for investment

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[2] Jed Horowitz, "Trust Departments Plan to Tap Japan; As Lucrative Securities Lending Arena", American Banker, Mar. 24, 1988, p. 1.

[3] _____, "Pension Funds were Overweight In Equity", Financial Times, Feb. 20, 1988, Section I, p. 9.

in the U.S. money market. Also, marks-to-market may be more difficult. Third, credit evaluation of borrowers may be more difficult, although many of the borrowers are the same broker/dealer firms active in the government securities market. Fourth, valuations for marking-to-market may be less timely or precise. (This is usually compensated by a higher collateralization rate; one New York bank requires 105 percent collateral on its Japanese loans compared to 102 percent for domestic ones.) Finally, regulatory requirements and practice (including taxation) may be difficult to learn or otherwise might be unpredictable. By way of illustration, cultural currents may be constraining the lending of equities in Japan: Some 80 percent of trading on the Tokyo Stock Exchange is for individual investors, who are likely to hold an issue for retirement in a personal brokerage account. This limits the supply of lendable securities. Short sales (a key reason for borrowing securities) are viewed as a lack of respect for the issuer, which may constrain the demand for lendable securities. A change in perceptions could dramatically change the competitive situation in Japan and, possibly, its regulation.

A September, 1987 article in Euro-Money magazine, published in the United Kingdom, pointed out that technology would speed the evolution of an international market for the borrowing and lending of securities.[4] It reported that an "automated market" was being developed to expedite settlements, add liquidity and generally encourage lending activity. Software called BLEND, being developed by I.P. Sharp Associates (a Reuters affiliate), would provide a real-time, on-line link between borrowers and lenders across the globe. Automation initiatives such as BLEND are made economically possible by increasing loan volumes, but their impact on the agency function may be worthy of attention. On one hand, such automation could streamline negotiations and inventory management or, on the other hand, perhaps eliminate the agency function by enabling lenders to deal directly with borrowers. Lenders

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[4] Tony Shale, "The Sharp End of Borrowing and Lending", Euro-Money, Sept. 1987, pp. 421-429.

would still probably require a global custodian, a valuation service for monitoring collateralization levels and a credit rating service for monitoring borrowers. The wide spreads would more than compensate for these costs, leaving a substantial risk premium and profit. One illustration of such an approach is that taken by CREF (the $30 billion College Retirement Equities Fund), which has been lending foreign securities for five years without using a master trust bank. One CREF official noted in a 1987 interview, "We had very good profits last year. We do everything ourselves; I think that's the secret to our success."[5] Obviously, a fund the size of CREF can achieve economics of scale in global lending that are beyond the reach of smaller funds.

An operational problem can arise as a pension fund sells foreign securities it has put out on loan. The agent will generally try to call the loan, which may be difficult in an international environment where much clearing is performed manually. The alternative is a substitution of lenders, providing that another pension fund has the same stock available for loan with that agent. This substitution feature is a unique benefit of the agency function.

Global lending is further complicated by national differences relating to:

Collateral:

- pricing sources and discrepancies
- mark-to-market parameters (generally 105 percent to 110 percent)
- cash movements and rebate procedures

Corporate Actions:

- rights offerings
- recalls and buy-ins

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[5] Marlene Givant, "Lending of global securities heats up", Pensions & Investment Age, June 15, 1987, p.41.

Taxation:

- withholding taxes for dividends
- stamp taxes for dispositions of securities

Varying Degrees of Supervision:

- Japan: few lenders (Japanese Securities Finance Company is the sole recognized one), most regulated of major financial markets
- United Kingdom: more lenders, but a high degree of regulation; uncertainties attending post-1992 activity
- United States: many lenders, limited supervision in comparison to the Japanese and European financial markets.

Appendix B. Mortgage-backed Securities Lending

Lending of mortgage-backed securities cannot be viewed in the context of government securities lending. In fact, the most prevalent form of financing short mortgage pass-through positions (i.e., "dollar-rolls" or "buy/sells") would not be legally or technically defined as securities loans. However, a brief discussion of the mortgage financing market is offered here in an attempt to provide a broader understanding of the lending market. Moreover, mortgage lending practices form a good comparative base from which to view the more evolved government lending market.

Mortgage lending is not as highly developed as government lending, but has developed along two lines: (1) the lending of GNMA, FNMA, and FHLMC pass-throughs are done directly by mortgage trading desks as dollar-rolls or buy/sells, and (2) the lending of CMOs is beginning to grow and mirrors the lending of corporate debt obligations more than it does governments.[1]

Mortgage pass-throughs are principally lent directly from trading desks, rather than through a financing desk. As noted above, these loans are referred to as either dollar rolls or buy/sells. In this transaction type, a dealer (the borrower) will buy a specific pool of mortgages and simultaneously sell the customer (the lender) a generic pool, at a specific coupon level, for forward settlement. The price differential between the buy and the sell can be viewed as the dealer's borrowing fee for obtaining use of the "purchased" security, with the term of the loan defined as the length of time until settlement of the forward sale.

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[1] Presently, CMO lending is relatively dormant; however, some participants believe that lending in this area is bound to grow in line with increased use of the CMO vehicle by investors.

Buy/sells or dollar rolls are handled directly between the trading desk and the customer because of the sophisticated nature of the mortgage product. Pricing of such a loan will largely be a function of the prepayment speed of the specific pool "purchased" by the borrower. That is, changing prepayment rates is the single most influential marginal factor for pricing mortgage pass-throughs. The esoteric nature of prepayment modeling tends to limit mortgage buy/sell or dollar roll counterparts to dealer trading desks and their sophisticated customers. Traditional agents or more passive mortgage investors are typically not participants in the lending of mortgage pass-throughs because of these pricing complexities.

Accelerated growth of mortgage lending is inhibited by the following: (1) the generally complex nature of the mortgage product, (2) unique settlement and allocation requirements of the market, (3) high market segmentation, resulting in illiquid markets for many product types, (4) problems associated with exchanging physical securities,[2] and (5) complexities of coupling forward settlement (which plays an important role in the mortgage market) with the open term convention of the more mature government securities loan market.

If lending of mortgages were to grow, it could have positive connotations in terms of fail rates and general dealing spreads. With active lending of mortgage securities, fail rates would tend to decline. Lending would also help add liquidity to the market, resulting in tighter, more efficient bid-ask spreads.

Some participants expect the next mortgage lending growth spurt to occur in the CMO sector of the mortgage market. This expectation is grounded on the belief that CMO issuance will continue to grow. As a result of such issuance growth, there will be more trading and shorting of the CMO product. The increased shorting of CMOs would in turn lead to

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[2] Although some mortgage-backed securities can be sent by wire, most remain physical. Given a successful immobilization effort, such as the establishment of the Participants Trust Company, lending growth would probably accelerate. However, immobilization of mortgages removes only one of the obstacles facing mortgage lending.

greater demand for CMO securities loans. However, growth in CMO lending may be somewhat hampered be the segmented nature of this derivative product.

For the foreseeable future, mortgage lending will be concentrated in the buy/sell activity of dealer trading desks. Dealers may also be able to successfully import the borrow program transaction type from the government market to cover short mortgage positions through loans. Through such programs dealers may be able to obtain knowledge about the lendable supply of mortgages before positioning in the security. Borrow programs also allow dealers to pledge some of their more illiquid mortgage collateral in exchange for more current mortgage securities. However, to date this form of the securities loan transaction type is not widely used to cover short mortgage positions.[3]

In sum, development of mortgage lending is dependent on developments in many other areas of the mortgage market. Moreover, these developments will also shape lending's eventual impact on the mortgage market.

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[3] Ironically, it is used more frequently in combination with government RPs to finance long mortgage positions, as discussed in Chapter II.

Appendix C. Text of Provost

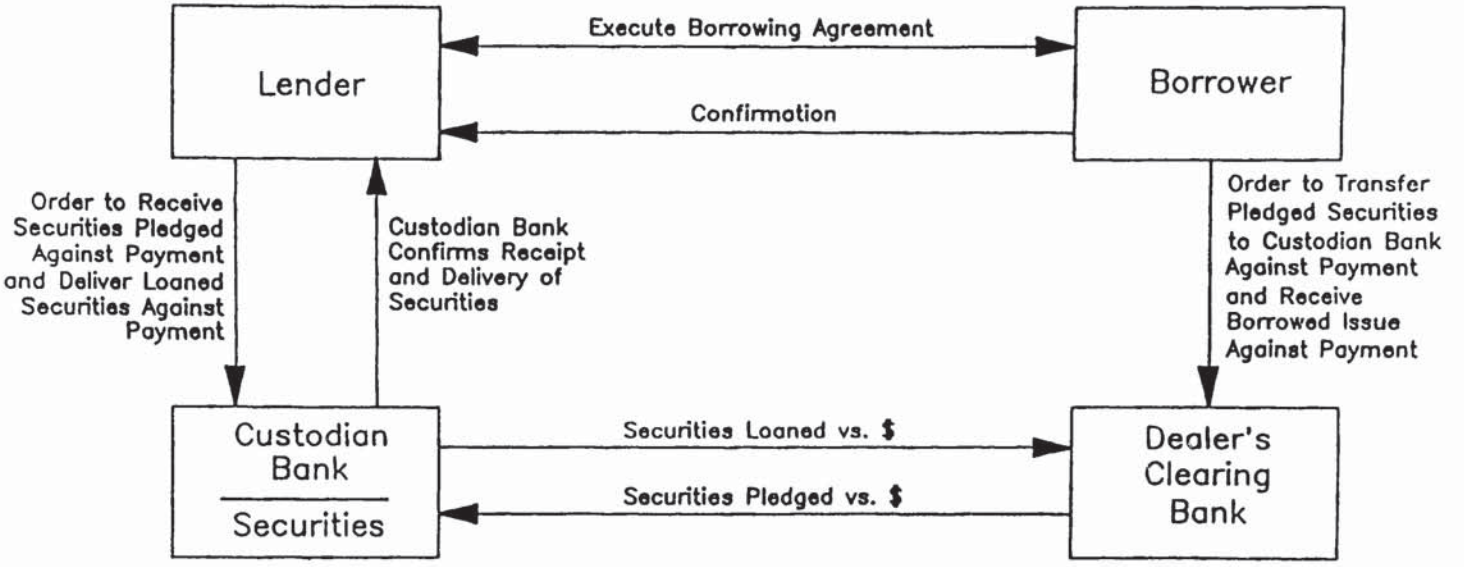
But the borrower of stock holds nothing for account of the lender. The procedure adopted and the obligations incurred in effecting a loan of stock and its delivery upon a short sale neither contemplate nor admit of the retention by either the borrower or the lender of any of the incidents of ownership in the stock loaned. The seller, having contracted to sell securities which he does not own, is under the necessity of acquiring dominion over stock of the kind and amount which he has sold, with unrestricted power of disposition of it in order that he may fulfill his contract. Whether his broker acquires the stock by purchase or by giving to the lender of it the market value of the stock plus his personal obligation to acquire and return to the lender, on demand, a like kind and amount of stock, the legal effect of the transfer is the same. Upon the physical delivery of the certificates of stock by the lender, with the full recognition of the right and authority of the borrower to appropriate them to his short sale contract, and their receipt by the purchaser, all the incidents of ownership in the stock pass to him.

When the transaction is thus completed, neither the lender nor the borrower retains any interest in the stock which is the subject matter of the transaction and which has passed to and become the property of the purchaser. Neither the borrower nor the lender has the status of a stockholder of the corporation whose stock was dealt in, nor any legal relationship to it. Unlike the pledgee of stock who must have specific stock available for the pledgor on payment of his loan, the borrower of stock has no interest in the stock nor the right to demand it from any other. . . . For the incidents of ownership, the lender has substituted the personal obligation, wholly contractual, of the borrower to restore him, on demand, to the economic position in which he would have been, as owner of the stock, had the loan transaction not been entered into. 269 U.S. at 455-56.

Appendix D. Diagrams.

Securities Borrowing vs. Pledge

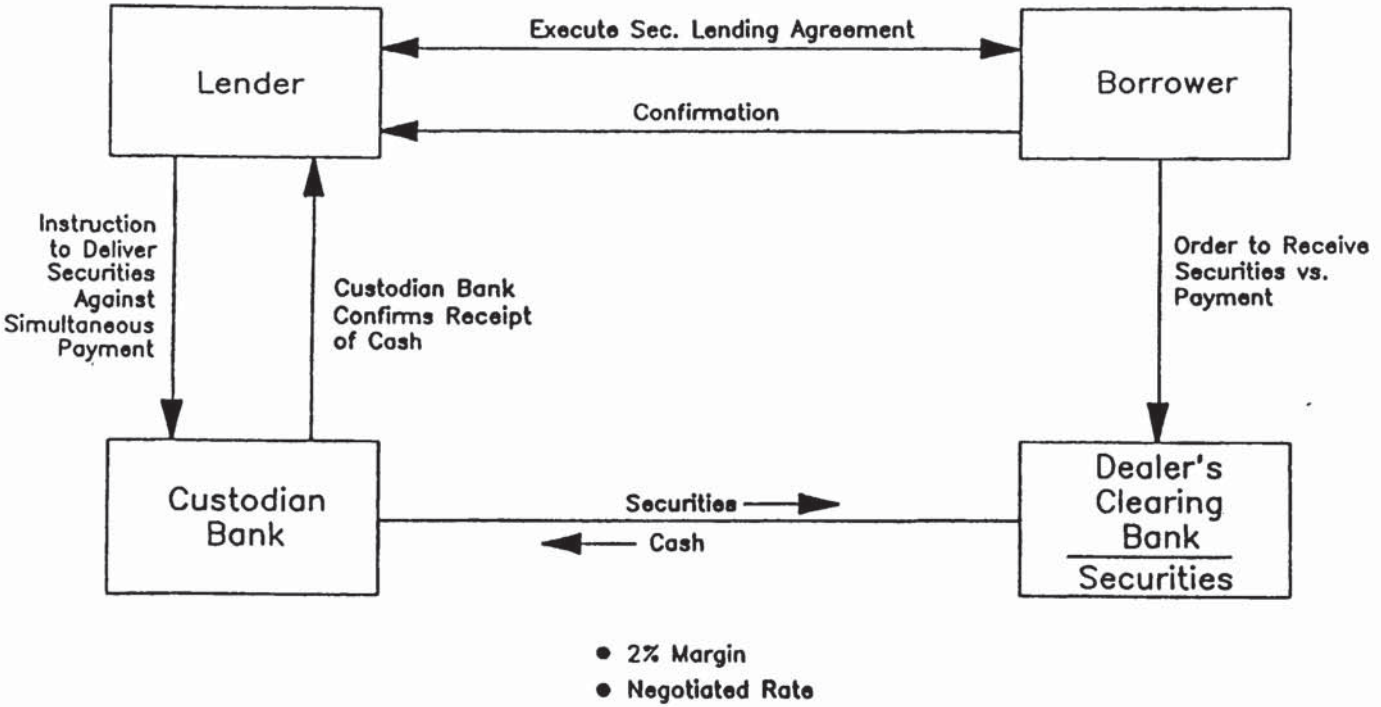
Collateral to Lender/Specific Issues to Borrower


Lender
Execute Borrowing Agreement
Confirmation
Borrower
Order to Receive Securities Pledged Against Payment and Deliver Loaned Securities Against Payment
Custodian Bank Confirms Receipt and Delivery of Securities
Order to Transfer Pledged Securities to Custodian Bank Against Payment and Receive Borrowed Issue Against Payment
Custodian Bank
Securities
Securities Loaned vs. $
Securities Pledged vs. $
Dealer's Clearing Bank

- 2% Margin
- 50 Basis Points Fee
- Loaned Securities May be Recalled by 10:00 AM

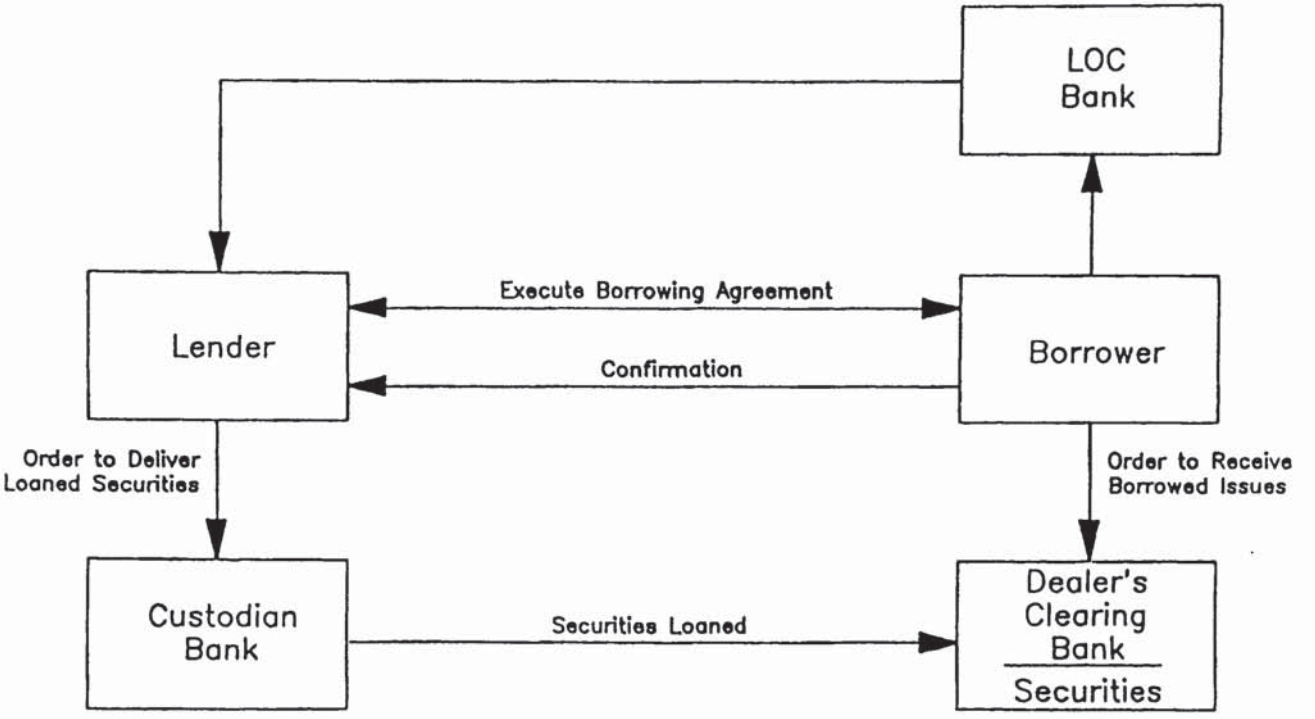
Borrow vs. Cash

Collateral to Borrower/Cash to Lender



Securities Borrowing vs. Letter of Credit

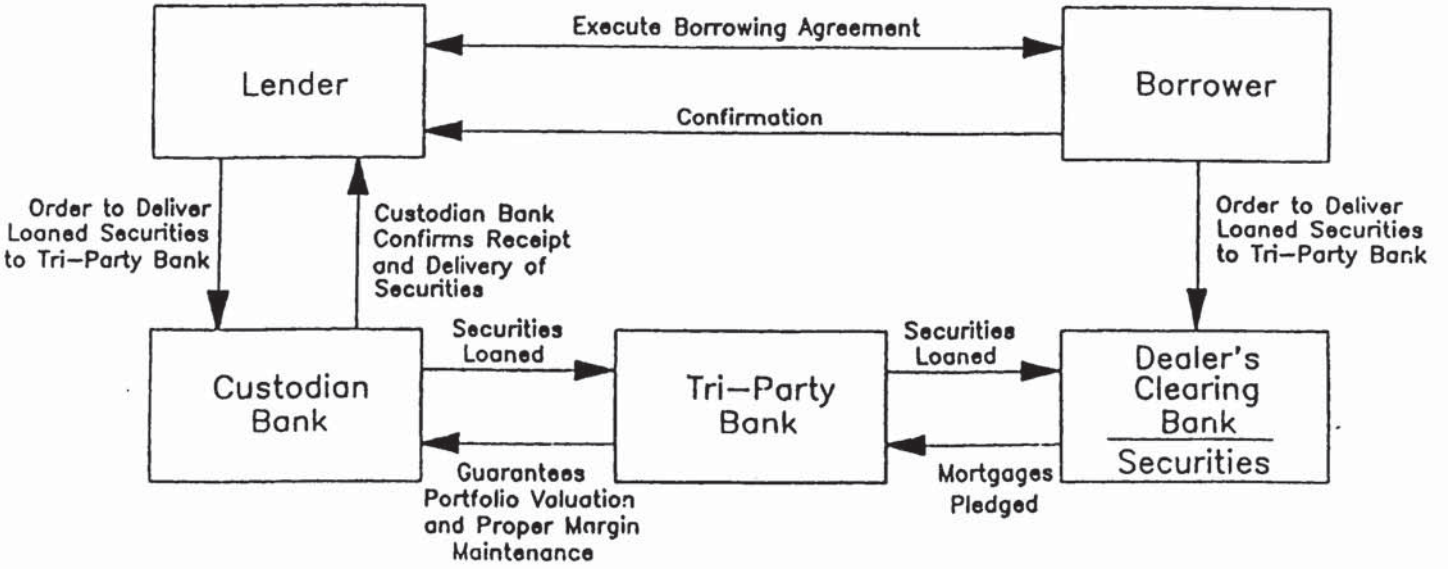
Collateral to Borrower/Letter of Credit to Lender



- 2% Margin
- 25 Basis Points Fee
- Unlimited Right of Substitution

Borrow Program

Collateral to Borrower/Mortgage–Backed Collateral to Lender



- 2% Margin
- 20–30 Basis Points Fee
- Entire Government/Agency Portfolio Available for Loan

C H A P S
The Clearing House
Automated Payment System

C H A P S

The Clearing House Automated Payment System (CHAPS) is a high-value electronic pound sterling clearing system operated in London, England. It is owned by the CHAPS and Town Clearing Company, Ltd., which, in turn, is jointly owned by the 14 banks that are settling members of these two large-value clearing systems. This paper describes the operations of CHAPS against the background of the domestic payments system in Great Britain. It focuses on how CHAPS reflects the relationships that exist among payment system participants in England, and on how those relationships have helped shape its unique character. Finally, the paper frequently compares and contrasts CHAPS with its U.S. counterparts, Fedwire and CHIPS, and concludes with a discussion of payment system risk issues in all three systems. The way in which these issues are dealt with over time appears to have at least the potential to make the three systems more similar.

I. Payment Systems in England

Non-cash payments in England generally take one of four forms: checks, giro credit transfers, electronic bulk items, and same-day high-value electronic payments. Checks are by far the most common method of non-cash payment, but electronic payments, in both high value and bulk form, are growing rapidly both in number of items and in value. Processing and settlement of payments in England involves five distinct clearings: (1) a general clearing for checks of any size drawn on bank branches; (2) a separate clearing for paper giro credit items; (3) an automated clearing house operation ("BACS") for batch EFT payments, credit and debit; (4) a high-value same-day check clearing ("Town" Clearing) for checks of 10,000 pounds and over drawn on and paid into bank branches located within the financial district of the city of London (known as "Town Clearing"), and (5) CHAPS, a nationally available electronic same-day settlement network for credit transfers of 7,000 pounds and over.

Ownership and operation of all payments clearing and settlement processes historically was the province of the large London clearing banks that formed the Committee of London Clearing Bankers. At the point of CHAPS formation these were Barclays, Lloyds, Coutts, Midland, National Westminster, and Williams and Glyn's, collectively known as the CLCB. Together with the Bank of England, the Central Trustee Savings Bank, the Cooperative Bank and the National Girobank these institutions developed highly efficient clearing systems through the auspices of the Bankers Clearing House. As evidence of the efficiency of these mechanisms, all paper checks deposited anywhere in England and Wales clear within a uniform three days in the general clearing. Large-value checks in the "Town" clearing settle on a same-day basis, and nearly 15 percent of the total cash and non-cash payroll and other payments at least theoretically suitable for the ACH process are made through the BACS. This compares with nonuniform and sometimes lengthy check-clearing times (5+ days) in the U.S., and only a little

better than a 1 percent rate of ACH use for suitable cash and non-cash payments.[1] While a variety of factors account for the relative efficiency of these payment processes, the control by a small group of large players, and their extensive branch networks within the country, certainly account for much of the difference.

Nowhere is the impact of this small, controlling group more evident than in the same-day processing and settlement of large-value items. These are cleared in two ways: in paper form through the so-called Town Clearing, and in electronic form through CHAPS. Town Clearing is by far the older of the two mechanisms. Its operations are based on the requirement that to participate banks must have an office within the square-mile area of the City of London at which high-value checks drawn on "City" offices of other Town Clearing participants can be deposited. These paper items are physically delivered by the Town branches to the Banker's Clearing House, where they are exchanged with those items paid in to the other Town Clearing banks. Totals are struck reflecting the positions of each bank with all others by 4 p.m. each day; members have until 4:45 to return items presented to them unpaid, and the net-net amounts after returns are settled through entries on the respective banks' accounts with the Bank of England at about 5 p.m.[2]

Town Clearing involves a small number of items, about 16,000 on a daily average basis in 1987, but high value. No check of less than 10,000 pounds is cleared in this

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[1] This rate of ACH usage is derived from Federal Reserve System estimates of total 1988 ACH volumes, and an estimate of potential ACH volumes developed by Professor Bernell K. Stone, Brigham Young University for his paper entitled "The Electronic Payment Industry: Change Barriers and Success Requirements From A Market Segments Perspective", delivered at the 1988 Payments Symposium, Williamsburg, Virginia.

[2] It should be noted that the return of a check from the Town Clearing happens very infrequently (one informed estimate was once or twice over the last year) and then usually for technical reasons such as the lack of a signature rather than because the drawer of the check has insufficient funds.

mechanism (this limit will be raised to 100,000 pounds in November 1989); in 1987, the daily average value cleared was about 33 billion pounds, for an average transaction amount of about 2 million pounds. On a formal basis this system has been in existence since 1805. Prior to that time, check exchanges took place informally in London coffee houses.

In the early 1970's, the CLCB began to discuss replacing the Town Clearing with an electronic payment system. At that time, the Clearing House Interbank Payment System (CHIPS) in New York was proving successful, and the method of walking large-value items around to be cleared seemed unlikely to be able to support the growing number of sterling payments generated by money market and trade transactions worldwide.[3] However, the Town Clearing was efficient, well-known, reliable, and controlled by the CLCB. Moving to a CHIPS-like system opened the possibility of allowing non-clearing banks direct access to a central computerized payments system, as was the case with CHIPS. This would run counter to the traditions of the London banking market, in which all entry to the clearing systems by non-clearing banks was governed by the individual clearing banks. Moreover, as time progressed, members of the CLCB became convinced that the CHIPS model of a central computer processing all transactions did not offer the best in either technology or security arrangements. Thus, CHAPS implementation was delayed until 1984, and took a very different form than did its CHIPS counterpart.

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[3] "The Banker", October 1984, pg. 75.

II. CHAPS Rules and Operations

The CHAPS system for nation-wide inter-bank electronic credit transfers became operational on February 9, 1984. It is a decentralized process using computer systems called "gateways" located at and owned by settling members which are connected to each other by the communications provided by British Telecom's packet switching service (PSS). As noted earlier, 14 banks including the Bank of England, are settling members of the CHAPS company, although there are physically fewer settling participants than computers performing gateway functions, reflecting the fact that some are shared between two members. In cases where the gateway hardware is shared, however, separate software systems perform the gateway functions for each settlement member individually.

The 14 settlement members send and receive CHAPS payments between themselves and settle for such payments at the end of the day across their accounts with the Bank of England. These members have 13,500 branches in England, Scotland, Wales and Northern Ireland, all capable of initiating and receiving CHAPS payments.

Beyond the settling members, there are three other categories of CHAPS users. The first includes 258 participant banks who maintain agency account relationships with the settlers and can, subject to any intra-day limits imposed by the settler, initiate CHAPS transfers and receive such transfers addressed directly to themselves. These agent participants maintain accounts with one or more of the settlement members who settle CHAPS transactions on their behalf at the end of each day through the settling participant accounts with the Bank of England. The second category includes the major customers (corporations, non-financial institutions respondent banks) of the settlement banks who can request CHAPS payments, and be advised of their receipt, in an on-line, automated fashion. The final category are the smaller customers of settlers who can request that payments be received or initiated through CHAPS, but who do

not receive transfers directly addressed to themselves and do not maintain any form of on-line connection to the bank involved. It is interesting to note that from the point of view of the CHAPS rules and operations, there is little if anything to distinguish a non-settling bank participant from a corporate customer, particularly one that is on-line. Moreover, it appears to be up to the settling bank which of its customers including other bank participants will have access to CHAPS, and under what conditions, since there are no general system rules for participation at other than the level of a settling member.

In contrast to CHIPS which can be visualized as a hub-and-spoke system with each participant having its own terminal or computer connection to the central operating facility, CHAPS can be seen as a ring of several hub-and-spoke networks. In CHIPS, the central facility performs store and release payment functions for all participants, is responsible for real-time bilateral limit and sender net-debit-cap controls for all participants, and for the end-of-day netting process. In CHAPS, the gateway hardware and software, in combination with the settling member's internal systems, performs those functions individually for each member, participants, and other customers that use CHAPS through that member. There is no central control, a fact which is emphasized in the CHAPS rules as one of the basic tenets of the system.

The CHAPS rules define very specific responsibilities for settling members, whether on the send or receive side of a CHAPS payment. On the send side, each payment is guaranteed by the settlement bank, and constitutes an "irrevocable, guaranteed, unconditional sterling payment for same-day settlement",[4] regardless of whether the payment is that of the settler itself, or a nonsettling participant or other customer that goes through the settler for access to CHAPS. Thus, each CHAPS settler must control its depositor's activity closely.

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[4] "Clearing House Automated Payment System Clearing Rules", CHAPS and Town Clearing Co. Ltd., London, England, April 1987, page 4.

CHAPS payments must be routed to a valid endpoint included in the CHAPS Directory or routing table and be timestamped by the payer before close of business. Business hours were from 9:30 a.m. - 3:00 p.m. for the first two years of operation, but in July 1989 were changed to close at 3:10 p.m. CHAPS payments may not be conditional items, require the transaction to be completed by a deadline, or "seek to impose on the payer settlement bank any private arrangement which a payer may have negotiated with a customer".[5]

On the receive side, settlement banks accept no responsibility for transactions in "which some further action is dependent upon the time of day for the receipt of funds".[6] The receiver also agrees upon issuance of an electronic acknowledgement to the sender to give same-day value to its customer or other organization and to provide advices to the ultimate recipient when that is requested. Each receiving settler must accept all CHAPS payments that are timestamped by the payer before close of business. Thus, a settlement bank on either the receive or send side cannot restrict in any way the payments it receives from any other settlement bank, or from all other settlement banks in the aggregate. Intra-day caps on bilateral credit exposures within CHAPS are not permitted by the rules, nor are they technically feasible under the current system design. Finally, settlers agree to develop and maintain sufficient capacity in their own gateway software and hardware to receive and acknowledge all the CHAPS payment (and non-payment) messages "which it can reasonably foresee"[7].

CHAPS gateway systems have two distinct sets of functions, one standard, the other nonstandard. The standard set of functions and the hardware form the core design of the system. The hardware is Tandem computers which are designed to be fault-tolerant and

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[5] Ibid, page 5.

[6] Ibid, page 6.

[7] Ibid, page 6.

non-stop through the use of what amounts to duplicate hardware functions within each computer. The software is designed specifically for Tandem use, and conforms to the PSS communications requirements. CHAPS standard gateway software performs the following functions: (1) selects the appropriate destination for the payment based on coding in the message; (2) calculates a running settlement figure with each other settlement bank; (3) sends messages to other settlers over the PSS and acknowledges incoming messages from the PSS; (4) numbers each message sequentially to and from each other settler and maintains an audit trail; and (5) at close of business, and upon instruction automatically creates and compares net totals with each other participant gateway and initiates settlement.

The non-standard software in each gateway is known as "Bank Specific", and is, as its name suggests, unique to each settler. In combination with other internal software, the non-standard gateway systems accept payment requests from customers and notify recipients, make decisions about whether specific payment requests will be honored, capture accounting details, add or confirm a message authentication code that is required by CHAPS but is unique to each pair of settlers, and encrypt and decode each message again according to encryption keys that are exchanged between each pair of settlers.

The process of end-of-day reconciliation and settlement is rather simple and highly automated owing to the standard gateway functions. Because each gateway numbers each message to and from each settler individually, and keeps and reconciles money totals with each transfer, there is a continual check on the position of the settler with all others throughout the day. Settlers must timestamp payments by close of business each day to ensure they are made that day. Non-settling participants and other customers are normally required to have all payments submitted by a deadline prior to the 3 p.m. close. Shortly after the close, payments are cleared out of the system, the gateways reconcile with each other, and

settlement figures reflecting the net value of transactions between every pair of CHAPS settlers are sent to the Bank of England. Special software in the Bank of England's gateway reconciles the numbers for each pair of settlement banks. Once these data and its own position are reconciled, the Bank of England gateway nets the figures across all settlement banks developing a multi-lateral, net-net debit or credit position for each settler. These net-net amounts are then posted to the accounts of each settler on the books of the Bank of England, and this amount is shown as a separate entry on the central bank's account statements for each settler.

CHAPS rules also contain contingency arrangements if, for operational reasons, settlement cannot be completed in the normal fashion. If one gateway cannot reconcile with one or more of the others within five minutes of end-of-day cut-off, the affected participant can send its settlement figures to the Bank of England through an override procedure. This procedure does not absolve the settler from reconciling its figures with each other settler, but it does allow the mechanics of settlement to take place. Similarly, if a gateway does not receive the expected acknowledgement of settlement from the Bank of England within 15 minutes after close of business, it can override the gateway and complete end of day processing, though it continues to have the responsibility of ensuring the Bank has its settlement figures. Finally, if discrepancies continue to exist between two settlement banks, and settlement has been forced through the use of the override feature, the figures of the receiving or payee settlement bank are used for settlement purposes. If these are not available, the sending or payer's figures are used. Discrepancies remaining after settlement must be resolved outside CHAPS by means agreed to by the settlement banks involved.

As noted earlier, CHAPS rules also provide for measures to be taken by each settlement bank to protect the integrity of the system. The most important of these involve

message authentication and encryption.[8] Messages must be authenticated by each sender using codes that are unique to each pair of settlement banks. Receivers test each message for the appropriate code, thus ensuring that each payment received has been sent from an appropriate source. Possible outside reading or tampering with messages as they are being sent over the PSS is prevented by line encryption, a feature provided by private vendor software under an encryption code of conduct adopted by CHAPS members.

In contrast to CHAPS, in the U.S. CHIPS uses only authentication while Fedwire uses only encryption but is studying the use of authentication. One of the main reasons why the dual forms of security are feasible in CHAPS is the small number of participants. Both encryption and authentication involve the frequent exchange of algorithms or "keys" used to code and decode, and perform authentication between each pair of participants. Control of this exchange process is vital; if the sender and the receiver are using different keys, payments will be rejected until a correction is made. With a small participant base, it is a relatively easy task to change keys in a controlled fashion, but with the 140 CHIPS on-line participants, and the 6700 on-line Fedwire participants the task would be mammoth. In fact, both these U.S. systems use a type of encryption or authentication that involves key exchange only between the central site (either the Clearing House or a Reserve Bank) and the participant, rather than between each pair of participants, which, of course, would increase the number of keys to be controlled exponentially.

In addition to encryption and authentication each settlement bank is required to use the latest version of the standard CHAPS gateway software and cannot modify that software,

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[8] Message authentication is the process of adding a code to each message that is developed using a key known only to the sender and receiver. The receiver of the message must be able to duplicate the code when the message is received. Authentication ensures the message has come from the indicated source, and has not been altered. Encryption is the process of scrambling a message again using a secret method known only to the two parties. Encryption ensures a message cannot be read while in transit.

or make it available to any other party except another settlement bank. Finally, CHAPS rules require that each settler have a back-up gateway for use in contingency situations, or arrange to share the gateway of another settler when its own is not functioning. There also appear to be contingency arrangements beyond gateway back-up or sharing that can be invoked with the approval of the Chief Inspector of the Banker's Clearing House if communications between both a settlement bank's primary and back-up gateways and other settlement banks are severed. The rules are not specific, however, as to what those contingency arrangements are, though the rules explicitly require a receiving settlement bank to comply with its responsibility to make customer funds available on a same day basis, despite the fact that during a contingency it may not be able to issue the normal electronic acknowledgement of payment receipt to the sender.

CHAPS is managed by the CHAPS and Town Clearing Company through its Board of Directors. The rules provide for two committees of settlement members: the Operational Committee and the Technical Committee. Any settlement member may propose changes to CHAPS rules in writing to the chairman of the Operational Committee. These are referred to the Technical Committee which reviews and comments on the proposal. After discussion with each settlement member, the proposed changes and the views of both the Technical and the Operational Committees related to the proposals are forwarded to the Board. The Board then rules on the acceptability of the proposal and if accepted, the length of notice to be given to each settlement member before implementation.

The rules also provide for a sort of umpire for the settlement process. This individual, the Chief Inspector of the Clearing House, plays a similar role for all London paper and electronic clearing operations. The Chief Inspector can revise CHAPS hours and is the initial mediator of disputes between settlement members. If his intervention does not resolve the dispute, the matter is referred to the Board for a final ruling. The Chief Inspector also

maintains the routing tables for CHAPS, which are vital in assuring that payments are sent to the appropriate settlement member that has agreed to handle under an agency agreement the account of the receiving nonsettling CHAPS participant. Changes to the routing table are requested by the participant organization itself, but must be countersigned by each settlement member. Notice of the change must be provided no later than two weeks before the change is desired, and a copy of the approved change must be circulated at least one week before the operative date.

The routing tables maintained by the Chief Inspector designate participants with unique "sorting codes" of the settlement bank which handles the account of the participant. These sorting codes identify the branch at which the participant's account is maintained and are used for all the clearings through which the participant collects or makes payments using the same settler. Each settlement bank also must provide a default or "repair" sorting code to which all payments that cannot be applied by other settlers can be returned. Reasons for non-application can include "insufficient or incorrect bank or beneficiary details, authentication failure, late time-stamping, and non-receipt of details on payments addressed to another settler's sorting repair code"[9] in instances in which the original payment instructions did not specify the ultimate receiver and needed further clarification. These unapplied payments must be returned to the payer's repair sorting code as soon as possible, but in any case no later than 12 noon on the next business day. CHAPS rules provide that unapplied payments returned by noon of the following business day do not give rise to an interest payment by the payee to the payer for overnight use of the money involved. This is in contrast to the U.S. practice of compensation for missent wire transfers which recognizes the overnight value of the payments received but not applied. The rules also do not provide compensation for unapplied payments held over a

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[9] Ibid, page 9.

weekend. However, the rules do not prohibit such compensation either, and it is not clear that overnight or weekend compensation is never paid, particularly when circumstances indicate a payment would be equitable to all concerned.

By all accounts, CHAPS has functioned well in the five years since its implementation. While there are no statistics on the system's performance, both the computers used in the gateways (Tandem) and the telecommunications facilities purchased from British Telecom are reportedly extremely reliable. However, CHAPS, like its U.S. cousins CHIPS and Fedwire, is perceived by the ultimate user as the sum of its component parts, i.e., the settling and participant bank systems as well as the gateway hardware, software and communications facilities. In that regard, a sending bank can request extensions of CHAPS closing hours to accommodate system difficulties that could prevent it from getting all of its payments out by 3:10 p.m. Such extensions enable only the bank requesting them to send transfers since the system closes at its regular hour for outward bound transfers of all settlement members other than the requesting bank. These other settlers, of course, remain open to receive traffic from the requesting bank. In terms of frequency and duration, extensions have averaged in four years about one per week and about 22 minutes in length, with extensions in excess of 45 minutes extremely rare. This contrasts sharply with Fedwire which closes on time only about 50 percent of the time (though this is improving in 1989), and is closer to the CHIPS record of relatively few extensions.

The record of CHAPS vis-a-vis system extensions also needs to be considered in light of its relationship to the Town Clearing of large value checks. That clearing process closes at 3:50 each day, about 40 minutes after the CHAPS close. Thus, if a participant cannot, for whatever reason, function its payments through CHAPS, they can be converted to paper form and settled same-day through Town Clearing. Reversion to paper payments is not as easy now

as it would have been at the start of CHAPS since most CHAPS related processes have been automated and related staff reduced. Thus, late delivery of paper items into Town Clearing is becoming very difficult, but in extreme circumstances is still possible. In addition, in exceptional circumstances the Bank of England will allow late transfers between settlement bank's accounts on its books. In this regard, then, CHAPS is quite similar to CHIPS; its close is followed by the close of another large value payment system which can be used, albeit with some difficulty, in both cases to process payments that are not made as originally intended. Fedwire, then, becomes analogous to the Town Clearing in which final settlement transactions for the day are made.

As more and more payments are processed through CHAPS, however, it is possible that system problems and extensions may become more of an issue. As shown on the attached tables, CHAPS volumes have nearly tripled in the period between 1985 and 1988, while the value represented five-fold. Town Clearing transaction volume, in contrast, declined by over 28 percent over the same period, while the values transferred grew by only 7 percent. CHAPS passed the Town Clearing in the total number of payments processed in early 1987, while later that year CHAPS total payment values exceeded the paper system. Clearly CHAPS has become the predominant method of making a large value payment in the U.K. With the reduction in minimum transfer size on CHAPS from 10,000 to 7,000 pounds in 1989, and to 5,000 in 1990, the related increase in minimum Town check size from 10,000 to 100,000 pounds mentioned earlier, and the change in CHAPS closing hours, dependence upon the system is expected to grow.

III. United Kingdom Payment Services and the Bank of England

As noted earlier, payment systems in the United Kingdom until 1985 were operated by a group of 9 banks and the Bank of England. In fact, control was effectively in an even smaller group of five banks that formed the CLCB and acted as shareholders of the Banker's Clearing House (BCH), which provided both facilities and staffing for the general and Town clearings and BACS, and operational oversight and supervision of CHAPS. The remaining members of the BCH provided input to the BCH on a consultative basis.

Direct access to the various payment systems was restricted to the nine member clearing banks and the Bank of England, which provides access to the payment systems for a variety of customers that use its clearing facilities. All others wishing to use such systems to collect and settle for payments had to do so through banking and agency relationship with one of the ten members. Criteria existed to accept new members into the BCH, but one of these involved a prospective member having at least 1 percent of the total volume of transactions processed through all payments systems, including the general clearing for small-value checks. Given the enormous branch networks of the major English banks, the likelihood that any newcomer would qualify as a member based on volume was remote. Other criteria for membership included the "existence of a branch network; an ability to accept and conform to the functional requirements and timetable of the clearing system including the establishment of a Town Clearing branch, and acceptance of the costs of participation".[10]

There is some indication that the restricted control of the U.K. payment systems had some major benefits. These were related not only to efficiency, but also to safety, reliability

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[10] "Payment Clearing Systems: Review of Organization Membership and Control; Members of the Bankers Clearing House, London, England, December 1984; Appendix I "Discussion of Policy Options", page 4.

and the broad range of services offered to customers with an agency relationship. One study states that in the early seventies the three major Scottish Clearing banks and the Yorkshire Bank were invited to join the Banker's Clearing House but declined stating that the quality of service they enjoyed through their agency relationships was more than satisfactory. Moreover, as will be discussed more fully later, the London clearers were willing to guarantee their own CHAPS settlement and in other ways absorbed risk in the payments system. Thus, control of the payments system had its costly side and required actions by BCH members that would support the entire system, not just the individual institution.

Nonetheless, the restrictive nature of payments system control became a significant financial and political issue, particularly with the growth of foreign bank entrants into the United Kingdom. In 1981, the Inter-Bank Money Transmission Consultative Committee was set up as a forum for consultation among members of the BCH and both bank and non-bank major users of U.K. payment systems, including foreign bank representatives.[11] The main function of this Committee was to facilitate information flow to and from BCH members on developments in money transmission systems and provide a method for large users to discuss problems.

Despite, or perhaps because of the existence of this arena for debate, pressure to broaden access to U.K. payments systems increased. In 1983, the U.K.'s National Consumer Council "in a report on retail banking recommended the Government review this monopoly if the clearing banks had not done something themselves in two or three years".[12] In 1983, Citibank, the largest foreign bank presence in the U.K., with 50 branches (and plans to increase that number to 200) and Standard Chartered Bank, a smaller but growing U.K. institution with

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[11] Committee of London Clearing Banks, Wilson Committee 1977, pg. 1177.

[12] "Clearers promise to open up the field", David Lascelles, Financial Times, December 12, 1984.

100 branches, applied to join the ranks of U.K. clearing banks. Citibank was initially refused because it had applied to join the CLCB when it should have applied to become a member of the BCH (which is, of course, owned by the CLCB), causing some embarrassment because the incident was probably unnecessary and only reinforced the image of a U.K. banking cartel.[13] Pressure from the Government and the Bank of England to find a way to deal with this problem intensified and in early 1984 the members of the BCH instituted a major review of the situation. Under the direction of Denis M. Child, Director and Deputy Group Chief Executive of National Westminster Bank, a working group undertook the review which was completed by December 1984. The group's report, widely known as the Child Report, was approved by the membership of the BCH and called for a major restructuring of the ownership and control of British payment systems. Such restructuring was implemented in December 1985.

Essentially, the new organization took control of all payments systems out of the hands of the CLCB and provided an ongoing way for all those involved in the payments process to have a voice, whether they be a major clearer or operate on an agency basis. The new structure has two levels. First, an umbrella organization, APACS (Association for Payment Clearing Services), which is set up as an unincorporated association, oversees the development of clearing operations and the payments industry as a whole. This organization absorbed much of the former function of the CLCB, through the use of a secretariat which performs studies as requested, collects data, and disseminates information on U.K. payments systems. All settlement members of each payment clearing including the Bank of England are members of APACS. Any other payment service providers that participate in one or more clearings on an

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[13] "Citibank 'applied to wrong body' in move to join clearing banks", David Lascelles, Financial Times, September 21, 1983.

agency basis can choose to join APACS as associates. As an associate, a payment service provider receives information about developments in the clearings in which it operates.

The second level of the new organization involves separate incorporated clearing companies for each payment type: (1) the Cheque and Credit Clearing Company Limited, with responsibility for bulk paper clearings of checks and credit items; (2) the CHAPS and Town Clearing Company Limited, with responsibility for same-day, high-value check and electronic clearings; (3) BACS Limited with responsibility for electronic bulk settlements, and (4) EFT POS U.K. Limited with responsibility for the design and implementation of a national, retail electronic funds transfer at the point of sale scheme that is scheduled for inauguration in mid-1989. Each individual company is responsible for the efficient operation, financing and development of the clearing under its control and operates with a high degree of autonomy. This allows organizations to be members/owners in one payment company and not another, thereby greatly broadening the potential ranks of settlers. Membership in the separate companies is open to all "appropriately regulated"[14] institutions that can meet the technical and operational requirements, are willing to pay a fair share of operating costs and an entry price determined by existing members, and have at least .5 percent of the payment volume involved in the clearing.[15] The final, and decisive, requirement is that the Bank of England must agree to permit the institution to settle its position in that clearing on the Bank's books. In this regard, it has been said that the Bank of England has veto power over the membership of each company and the

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[14] Members of the Bankers Clearing House, op. cit. "Introduction and Summary", page 8.

[15] The volume entry criterion for BACS Ltd was relaxed after the company was formed to an absolute minimum of 5 million items a year, or about .2% of current BACS volume.

Bank has not stated publicly how it has or will judge an applicant. However, as one Financial Times article noted "there is no reason to suppose it (the Bank) will act arbitrarily".[16]

The reorganization put in place by the Child Report established the existing members of the BCH as members of the check and CHAPS clearing companies. The existing five former CLCB owners of the BCH became members of BACS Limited which had existed as a company with substantial assets. Under the terms of the Child Report, a wider group became eligible for BACS membership, but the necessary reallocation of and payment for shares in BACS of necessity took some time to complete. Beyond that, a few other institutions qualified for check, while 25 institutions, including Citibank and Standard Chartered, qualified for CHAPS and Town Clearing Company membership, again based on volume. Not all of these institutions qualifying on the basis of size have been willing to pay both the inside systems development, computer and staff costs and the entry fees associated with membership. The entry fees alone have been estimated at between 150,000 and 200,000 pounds for BACS, and were reported to be 500,000 pounds for CHAPS. Thus, by comparison with agent relationships for the clearings, direct settlement status may not make sense economically even for a bank that processes sizable payment volumes. Aside from the CLCB banks and the Bank of England, the Bank of Scotland, the Central Trustee Savings Bank, Clydesdale Bank, the Royal Bank of Scotland, the Cooperative Bank, and the National Girobank were charter members of CHAPS. Moreover, in 1985, both Citibank and Standard Chartered were approved for membership in the CHAPS and Town Clearing Company, and they began operations in 1986.

The Bank of England performs two critical functions for the CHAPS system that are set out in the Child Report and the CHAPS rules. First, the Bank has the final say on which institutions can be members of the various companies that own the payments clearing

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[16] David Lascelles, op. cit.

processes. Final settlement for all British payment systems is accomplished through entries made to accounts maintained with the Bank of England. The Bank is necessarily selective as to the institutions to which it will grant settlement account facilities, especially for use in the same-day large value clearings. It should also be noted that an applicant must also be approved by the relevant clearing company, which confirms the applicant meets the necessary technical and system standards, and the APACS Membership Committee, on which the Bank of England does not sit, must also approve. Neither of these, however, could overrule a Bank refusal to grant an account. Reportedly, such a refusal has never occurred, though informally some applications may have been discouraged.

The second explicit function of the Bank of England is to perform the mechanical process of CHAPS settlement, which is done by the Bank's gateway software. This is consistent with the role the Bank plays in all other British payment processes. Settlement figures are computed for each clearing and the net totals are entered to the accounts of settlers on the Bank's books.

Both of these functions of the Bank relate to an even more important but implicit function. The Bank of England guards the daily settlement process closely. No rules exist to cover the unwinding of a CHAPS settlement, nor has any instance occurred where such action would have been considered or necessary. There appears to be no doubt in the minds of participants as to whether CHAPS settlement will take place, as there is at least conceptually with CHIPS settlement. This close control of settlement has two aspects. First, each settlement bank must guarantee each payment it sends on CHAPS, and each receiver is obligated to pass on final, same-day funds to customers. The Bank approves all settlement banks and finds it highly unlikely that they would not be able to settle each day and they, in turn, have every confidence in each other. Second, if a settlement bank were unable to settle, it seems probable that the

Bank of England would provide funding to complete settlement and sort matters out afterward. Indeed, given the fact that the final results of Town Clearing would not be available until at least an hour or more after the CHAPS close, the Bank would undoubtedly settle CHAPS under the expectation that the shortfall would be covered in the Town Clearing. This expectation of settlement is not stated in the CHAPS rules nor is it in any published written form, but it is understood apparently by all participants.

One final interesting aspect of the Bank of England's concern over CHAPS operations and settlement is that the Bank does not have the statutory power to directly regulate or examine either the CHAPS system itself or the CHAPS and Town Clearing Co. Ltd. All of the settlement members are regulated under the Banking Act of 1987. The common software that forms the basis of the system is owned by the CHAPS and Town Clearing Co. Ltd. which, reportedly, takes no responsibility for the content or settlement of the messages. However, the Bank is itself an owner of CHAPS and a settlement bank, so that it is directly involved in all decision-making and automation changes. This contrasts sharply with CHIPS in which the Federal Reserve is not a member but which is examined as a bank service corporation.[17]

[17] The examination is conducted jointly by the Comptroller of the Currency, the Federal Deposit Insurance Corporation, the Federal Reserve, and the New York State Banking Department. Lead responsibility for the examination rotates among the agencies every two years.

IV. CHAPS and Payments System Risk

Over the last several years, there has been increasing focus on the risks presented by large value electronic payments systems, particularly in the United States but increasingly in England, Japan, and the major Western European countries with developed electronic payments systems. These risks have been described in two ways: (1) the risk that a single payments participant will fail to make good on an end-of-day debit position--referred to as settlement risk--, and (2) the consequences for other participants in the payment system if a participant fails to settle--referred to as systemic risk.

Settlement risk is incurred by the provider of final payment to the ultimate recipient -- either the receiving bank if it passes on funds to a receiving customer before it has final settlement for such funds, or the central bank if it provides final settlement before balances are available. Essentially, then, the level of settlement risk in a payments system is dependent upon the credit judgement of the providers of final payment, and their overall financial resources. Systemic risk is a direct consequence of settlement risk - if the settlement of a large-value payment system is not virtually assured, then settlement failure could have negative systemic consequences. Such consequences have been demonstrated through modeling to be quite large, at least in a high-value net settlement system such as CHIPS.

The magnitude of settlement risk, and by implication, systemic risk, in a payment system varies based on four interrelated characteristics of the system: (1) the nature of the payment obligation; (2) the source of the obligation; (3) the size of the exposures in the system, and (4) the duration of the exposure.

In evaluating the risk inherent in the CHAPS system, it will be useful to look at the four characteristics as they apply to CHAPS and contrast them to the same characteristics in the U.S. counterparts to CHAPS: Fedwire and CHIPS.

A. Nature of the Payment Obligation

The nature of the payment obligation refers to the question of whether or not the payment is final when made. Three types of finality have been defined: (1) sender finality; (2) receiver finality, and (3) settlement finality.

Sender finality exists when there is an unconditional obligation on the part of the payments system participant that initiates the transfer into the system to make the payment to the recipient. Sender finality exists in all three electronic systems; but the restricted number of actual CHAPS participants gives sender finality a somewhat different perspective on that system. That is, on Fedwire and CHIPS the actual number of payment system participants is large (140 on CHIPS, 9,000 on Fedwire), and payments are initiated in the name of the participant. Thus, the obligation for making the payment is spread over the broad base of participants.

In CHAPS, however, there are only 14 settling bank members which are obligated to make all payments sent through their gateways by any participant allowed access to their system. Of course, settlement members can and do set limits on the payments that will be made for a given participant, and a member will only pass on those payments it has approved in one way or the other. Despite this, it is not clear whether all 14 members enforce sender finality on their customers though contractual arrangements, and the CHAPS rules are silent on this. Thus, a CHAPS member would be obligated to settle a payment for a failed customer even if that customer's account were in overdraft. The bank, could, of course, sue its failed customer to recover the payment but the terms under which it would do so would be governed by the bilateral contractual relationship between the bank and the failed customer.

Receiver finality occurs when the receiver of a payment passes on final funds to a third-party customer. Such finality creates risk when final funds are given to a customer before the sender actually makes payment. Providing receiver finality presents little risk to private sector

participants on Fedwire due to the fact that the Reserve Banks "guarantee" the finality of each payment "when the transferee's Reserve Bank sends the transfer item or sends or telephones the advice of credit for the item to the transferee, whichever occurs first."[18] Thus, over Fedwire payment-by-payment finality is provided by the central bank and enables the receiver to "credit promptly the beneficiary's account or otherwise make the amount available to the beneficiary"[19] without risk to the receiver. For, indeed, the provider of finality of payment to the ultimate recipient absorbs the risk that the payment will not be made. On Fedwire this risk is assumed by the Reserve Bank.

On CHIPS, receiver finality does not exist until settlement. The recipient bank is not obligated by CHIPS rules to pass on funds to the ultimate receiver before that time, though in practice this is often done. CHIPS requires each participant to establish bi-lateral credit limits to control the exposure from other senders, and facilitate receiver finality, but a number of Clearing House banks perceive that a requirement to immediately grant all customers irrevocable credit for CHIPS payments would greatly increase the risk of participation in that system.

As noted earlier, CHAPS rules require members to pass on all payments received from other members in a timely way, in language similar to the way in which Fedwire participants agree to make payment, but without a central bank providing the payment-by-payment finality. There is no provision for payment-by-payment finality in CHAPS, as there is in Fedwire, and settlement occurs late in the day. Thus, CHAPS members must step up to the risk of providing receiver finality with no explicit guarantee that funds will be available. Their willingness to do so

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[18] Regulation J, Subpart B, Section 210.36(a), Board of Governors of the Federal Reserve System, June, 1981.

[19] Ibid, Section 210.30(b)(2).

obviously rests in their faith in the financial health of the other CHAPS participants, and, if all else fails, their conviction that the Bank of England would step in to prevent any systemic problem.

Settlement finality exists in a net settlement system if processes are established to ensure settlement will always occur, despite the failure of any one of its participants. If settlement finality is assured, receivers of payments will be more willing to pass on final funds to their customers upon receipt, though they would not be required to do so. Settlement finality is not an issue on Fedwire as it is not a net settlement system, but it is an issue on CHIPS. For settlement purposes, the exposures of the 140 CHIPS participants are netted, combined, and settled through only 22 settling participants. The provision of such a settling service, however, does not create any obligation to settle on the part of settling participant since it can refuse to settle on any given day. That is, Bank X may be unconditionally obligated to make a payment released over CHIPS, but its settlement bank, Bank A, is not obligated to settle for XYZ. CHIPS rules provide for a refusal to settle, and unwind procedures, which act to increase the settlement risk faced by any CHIPS participant that has passed on a payment to a customer. Moreover, the unwind procedure itself is a major cause of systemic risk as the elimination of the transfers of a failed participant could cause another to fail. In recognition of this risk, CHIPS participants have developed a way to guarantee settlement that uses an underlying collateral pool. Settlement finality on CHIPS will be implemented in the last half of 1995.

In CHAPS also there is no formal method of providing settlement finality, and, unlike CHIPS, the idea of settlement failure, or an "unwind" to take the obligations of a failed sender out of the system, is not even addressed in the rules of operation. Again, as in the area of receiver finality, absolute faith is placed in the creditworthiness of the other participants and the willingness of the Bank of England to provide settlement regardless of any other problem. Thus, settlement finality, while not explicitly provided, is assumed to be present.

B. The source of the obligation

This characteristic refers to the creditworthiness of the originator of the payment and is closely linked to the various types of finality, particularly in net settlement systems. Sender finality becomes more or less valuable in reducing risks in a payment system depending on the confidence a receiver has in the sender's financial viability. Receivers will be more willing to pass on final funds to third parties if they are absolutely confident the sender will settle, and settlement finality will be assured if all senders are financially viable. The source of a payment obligation thus adds less risk to a payment system if the possible originators are closely managed and controlled, and, all else being equal, if they are fewer in number.

In CHIPS there is a formal process of participant approval that has both credit and operational readiness aspects to it. However, potential anti-trust concerns related to the fact that membership is controlled by the 12 New York Clearing House Banks have been thought to limit the ability of CHIPS to strictly control either the addition of new members, or the elimination of existing weaker participants. As noted earlier, bi-lateral limits help CHIPS participants control their exposures to other participants, but a further control on membership is expected to come when settlement finality is adopted. The method selected to ensure settlement finality is expected to reduce the number of participants to those willing or able to agree to provide such finality - a number universally assumed to be smaller than the current 140 and to include fewer foreign bank participants.

In CHAPS, the small, controlled number of members makes the source of the obligation less of a risk to the system, though, as noted earlier, depending on its contractual arrangements with customers, there may be some risk to the individual member. However, just as CHIPS is likely to get smaller, there is some reason to assume CHAPS may get larger and the source of the payment become a larger issue.

As noted earlier, access to CHAPS member status has been broadened by the organizational reforms implemented in response to the Child Report. However, some report that there could be pressure for further broadening, and recognition of a second tier of participants which are banks but not settlers. Two specific matters related to access have generated controversy: a 2:45 deadline for non-settler traffic that reportedly is enforced by some settling members, and the lack of standards for access to CHAPS through a settling bank.

Non-settling bank participants (primarily U.S. banks) argue that the 2:45 non-settling closing hour discriminates against them by treating them the same as any corporate user of CHAPS which would have the same closing hour. Settling banks that impose such a rule give themselves the last 15 minutes to clear out messages and prepare for settlement; non-settlers need time for that process also, but, reportedly, at least some settlers require non-settlers to complete that process by 2:45. In those situations it is unlikely that a non-settling bank could compete for the wire transfer business of large corporations since such banks would have to require that their customers close even earlier than 2:45.

At present, each settling bank on CHAPS maintains its own internal network and banking relationships with its customers who are participants in CHAPS. These networks involve various types of equipment and software that are unrelated to CHAPS standards. Thus, a bank who is a participant in CHAPS through a settler is linked to the system in a fashion that may be totally different both from the way its settler is connected to CHAPS, and from the way another participant, using another settler, is linked. This process of customizing networks creates a problem for non-settling banks in changing relationships with settlers, since such a change could involve costly, and time-consuming changes in hardware and software. Large foreign banks believe they are caught in a bind that effectively reduces their ability to compete - they cannot offer competitive closing hours, and they cannot switch settlers with ease to improve their cost

or operating procedures. Thus, some believe the equality of access to this major English payment system to be flawed.

It may be that this technical issue will diminish over time. To some extent it is a product of counsel to the CHAPS members regarding the anti-trust implications of each of them requiring the same technical interface arrangements to customers, thereby eliminating a small area of competition among them. However, as more and more CHAPS payments are generated from SWIFT instructions, the SWIFT format and other technical specifications are rapidly being adopted within the settling member networks. In addition, work is progressing on improving the translation between the CHAPS and SWIFT formats, similar to work underway now in the CHIPS system. Thus, it seems likely that while settling member services may vary, the technical requirements to link to any settler will converge on SWIFT specifications, thereby easing the job of the participant in switching settlement members.

It is unclear whether membership in CHAPS can, will or should be broadened to include a second tier of bank members with more privileges. However, despite the restrictions on competition, it is clear that more foreign banks will generate enough payment volume to become settling members. This may intensify the pressure on the Bank of England to increase membership, possibly beyond the group that the Bank of England would consider strong enough to ensure settlement will always take place.

C. The size of the exposures in the system

The size of net exposures in a payment system, i.e., the difference between what has been sent out over the system versus what has been received (or is on hand), can be measured in two ways: at peak periods intraday, or net-net at the end of the day. Measuring exposures at the end of the day answers the question of how liquid individual participants must be in order to accomplish settlement. Such a measurement does not really address the

question of systemic risk, however, particularly in net settlement systems such as CHIPS and CHAPS where the small size of the net-net end of day positions of settling members belies the extremely large values transferred. If one participant were to have operational or liquidity problems, for example, that prevented it from sending transfers, enormous end-of-day debit positions could result at other participants. Thus, intra-day measurement of peak exposures has been used in the United States as a measurement of systemic risk.

On CHIPS and Fedwire there has been a concerted effort over the last several years to measure intraday exposures in the form of what are called daylight overdrafts. These typically average about $90 billion dollars across both systems, with a daily peak of $45 billion on CHIPS, and $60-65 billion on Fedwire.[20] Moreover, one way in which the success of the current payment system risk program in the United States has been at least inferred, if not measured, is the fact that peak overdraft amounts have stabilized against a background of the rapidly increasing dollar value of payments handled.

The Bank of England does not measure CHAPS exposures intraday, nor is it clear whether such a measurement is possible across all of the system's gateways without bringing the system to a halt in order to do so. Bank of England staff have argued that due to the existence of the Town Clearing for large value paper items exposures on CHAPS, even if they could be measured, would not tell the whole story. Intraday measurement of exposures in Town Clearing is not possible, and that system settles later than CHAPS. It is true that items in the Town Clearing are provisional, while CHAPS payments are both sender and receiver guaranteed, but in some senses that makes the settlement of these very large items even more risky. Banks have a limited idea of what high value items customers have drawn during the day

[20] Fedwire and CHIPS peak exposure amounts do not add to daily total because they occur at different times than does the aggregate high point.

that will be presented in the Town Clearing, and very little time from the close of CHAPS to the close of Town clearing to decide whether to pay such items. Typically payment must be made from balances that depend on the availability of large value checks received as deposits in the Town clearing that day. The reality is that until the Town Clearing occupies a much less substantial place in large-value settlement in Great Britain, the Bank may not take the necessary steps to measure exposures. Also, as noted earlier, CHAPS rules require that payments made over the system be unconditional. This has been interpreted to mean that exposure controls like the bilateral limits in CHIPS could not be implemented on CHAPS without rule changes.

This may not be the case indefinitely. Reportedly, the relationship of CHAPS and Town Clearing is under constant review, particularly as it relates to moving more large value items from the clearing to CHAPS. In July 1988, the minimum payment size in CHAPS was dropped from 10,000 to 7,000 pounds and it will be dropped to 5,000 pounds in 1990, which should encourage movement from paper cleared now in both the general and Town Clearings. Moreover, in November 1989, the minimum size of a Town check will be raised to 100,000 pounds, further heralding a bigger use of the CHAPS system. CHAPS now accounts for the majority of large-value payment in England and that fact alone should begin to prompt changes in the attitude toward intra-day measurement of exposures.

D. The duration of exposures

The duration of exposures in a payment system refers to the time period over which credit recipients remain exposed to the variety of factors that can delay, or prevent settlement. The impact on payment system risk of exposure duration is directly related to finality. On Fedwire, the initiation of a payment and its settlement can be virtually instantaneous with the guarantee of each payment by the Federal Reserve, and involve no credit exposure to the recipient. Thus, while daylight exposures can be very large in Fedwire, and extend over

most of the day, they do not create systemic risk due to the fact that finality occurs very shortly after payment initiation when the payment moves across the Federal Reserve books to the receiver. Daylight exposures and their duration do present risks to the Federal Reserve, particularly if overnight overdrafts occur, but the payments system itself is reasonably insulated from this risk by the central bank.

CHIPS exposures can extend throughout the day and do present systemic risk. However, such risk has been moderated since 1981 when CHIPS began settling on a same-day basis. Prior to that, exposures remained overnight until settlement at the Federal Reserve midway through the next business day. Next-day settlement was highly risky for major participants since it meant that a failure to settle one day would almost certainly result in the failure to settle the next day, since that day would be half finished before the first day's failure would be known and precautions taken. Interestingly, same-day settlement increased Federal Reserve risk since less is known about available reserve balances prior to CHIPS settlement than would have been possible under the earlier system.

CHAPS is also a same-day settlement system. There is little time between payment initiation and finality-like Fedwire - but the finality is provided by the member, not the central bank. Thus, the risk to the member, and conceivably to the system itself, is arguably much greater than Fedwire. Again, this is not necessarily the view of the CHAPS member nor the Bank of England. To both, CHAPS presents little risk, due primarily to the quality of its members and the implicit support of the Bank of England.

V. Summary

CHAPS as it currently stands seems a remarkable achievement of payments system efficiency and security. It directly reflects the closely-held nature of the domestic British payments system, and the implicit support provided to that system by the Bank of England. It is also clear that payments system risk, though demonstrably present in the characteristics of CHAPS described above, is not a serious flaw, at least in part because of its traditional British design. However, the impetus behind the Child Report, and indications of some unrest among the foreign bank community, raise questions as to whether the U.K. payments system, and CHAPS in particular, can retain the characteristics of a private club, whose members are insulated from risks routinely faced in U.S. payment systems. If it does not, will the Bank of England always be ready to supply whatever pound liquidity is necessary to achieve settlement, or is it conceivable that a receiving bank could be shortchanged at settlement, yet have no recourse to its customers because of receiver finality?

Payments over CHAPS have grown rapidly both in transaction numbers and value. Will it be sufficient to have an ever-growing volume and value of transactions on a system that has no intraday central bank-provided finality? As Britain's systems for money-market security-transfer move from a physical to a book-entry basis, will the lack of central-bank assured finality either on a payment by payment basis or at the end of day be acceptable?[21] Will a broadened membership, if that comes about, create uncertainty about settlement? These questions and others lead to the intriguing thought that this payment system may end up being more like Fedwire or CHIPS, or some combination of the two, at the same time that CHIPS

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[21] See 1989 Ernest Sykes Memorial Lecture given by the Rt. Honorable Robin Leigh Pemberton, Governor of the Bank of England at the Annual General Meeting of the Chartered Institute of Bankers, May 24, 1989.

shows signs of moving in the direction of CHAPS at least insofar as its membership is likely to narrow.

COMPARATIVE ANALYSIS: NUMBER OF PAYMENTS
CHAPS VS. TOWN CLEARING
(1985-1988)

CHAPS (CLEARING HOUSE AUTOMATED PAYMENTS SERVICES)

NUMBER OF PAYMENT MESSAGES (THOUSANDS)

QUARTER	1985	1986	% CHANGE (1985-86)
FIRST	435	657	51.03%
SECOND	527	759	44.02%
THIRD	611	845	38.30%
FOURTH	644	900	39.75%
TOTAL	2,217	3,161	42.58%

QUARTER	1986	1987	% CHANGE (1986-87)
FIRST	657	920	40.03%
SECOND	759	1,062	39.92%
THIRD	845	1,181	39.76%
FOURTH	900	1,223	35.89%
TOTAL	3,161	4,386	38.75%

QUARTER	1987	1988	% CHANGE (1987-88)
FIRST	920	1,257	36.63%
SECOND	1,062	1,392	31.07%
THIRD	1,181	1,648	39.54%
FOURTH	1,223	1,484	21.34%
TOTAL	4,386	5,781	31.81%

QUARTER	1985	1988	% CHANGE (1985-88)
FIRST	435	1,257	188.97%
SECOND	527	1,392	164.14%
THIRD	611	1,648	169.72%
FOURTH	644	1,484	130.43%
TOTAL	2,217	5,781	160.76%

TOWN CLEARING

NUMBER OF PAYMENTS (THOUSANDS)

QUARTER	1985	1986	% CHANGE (1985-86)
FIRST	1,386	1,329	-4.11%
SECOND	1,364	1,316	-3.52%
THIRD	1,320	1,220	-7.58%
FOURTH	1,217	1,166	-4.19%
TOTAL	5,287	5,031	-4.84%

QUARTER	1986	1987	% CHANGE (1986-87)
FIRST	1,329	1,214	-8.65%
SECOND	1,316	1,176	-10.64%
THIRD	1,220	1,159	-5.00%
FOURTH	1,166	1,086	-6.86%
TOTAL	5,031	4,635	-7.87%

QUARTER	1987	1988	% CHANGE (1987-88)
FIRST	1,214	1,048	-13.67%
SECOND	1,176	976	-17.01%
THIRD	1,159	914	-21.14%
FOURTH	1,086	843	-22.38%
TOTAL	4,635	3,781	-18.43%

QUARTER	1985	1988	% CHANGE (1985-88)
FIRST	1,386	1,048	-24.39%
SECOND	1,364	976	-28.45%
THIRD	1,320	914	-30.76%
FOURTH	1,217	843	-30.73%
TOTAL	5,287	3,781	-28.48%

COMBINED TOTAL (CHAPS + TOWN CLEARING)

TOTAL NUMBER OF PAYMENTS (THOUSANDS)

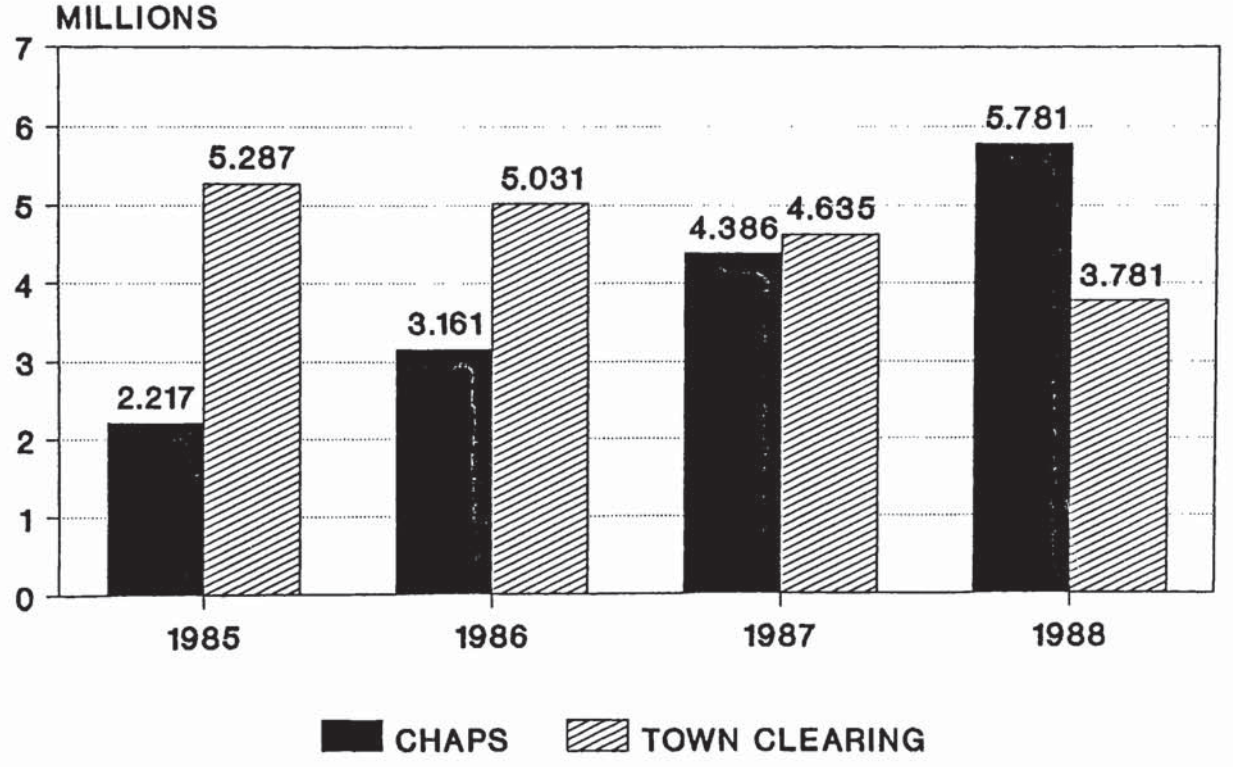
QUARTER	1985	1986	% CHANGE (1985-86)
FIRST	1,821	1,986	9.06%
SECOND	1,891	2,075	9.73%
THIRD	1,931	2,065	6.94%
FOURTH	1,861	2,066	11.02%
TOTAL	7,504	8,192	9.17%

QUARTER	TOTAL 1986	TOTAL 1987	% CHANGE (1986-87)
FIRST	1,986	2,134	7.45%
SECOND	2,075	2,238	7.86%
THIRD	2,065	2,340	13.32%
FOURTH	2,066	2,309	11.76%
TOTAL	8,192	9,021	10.12%

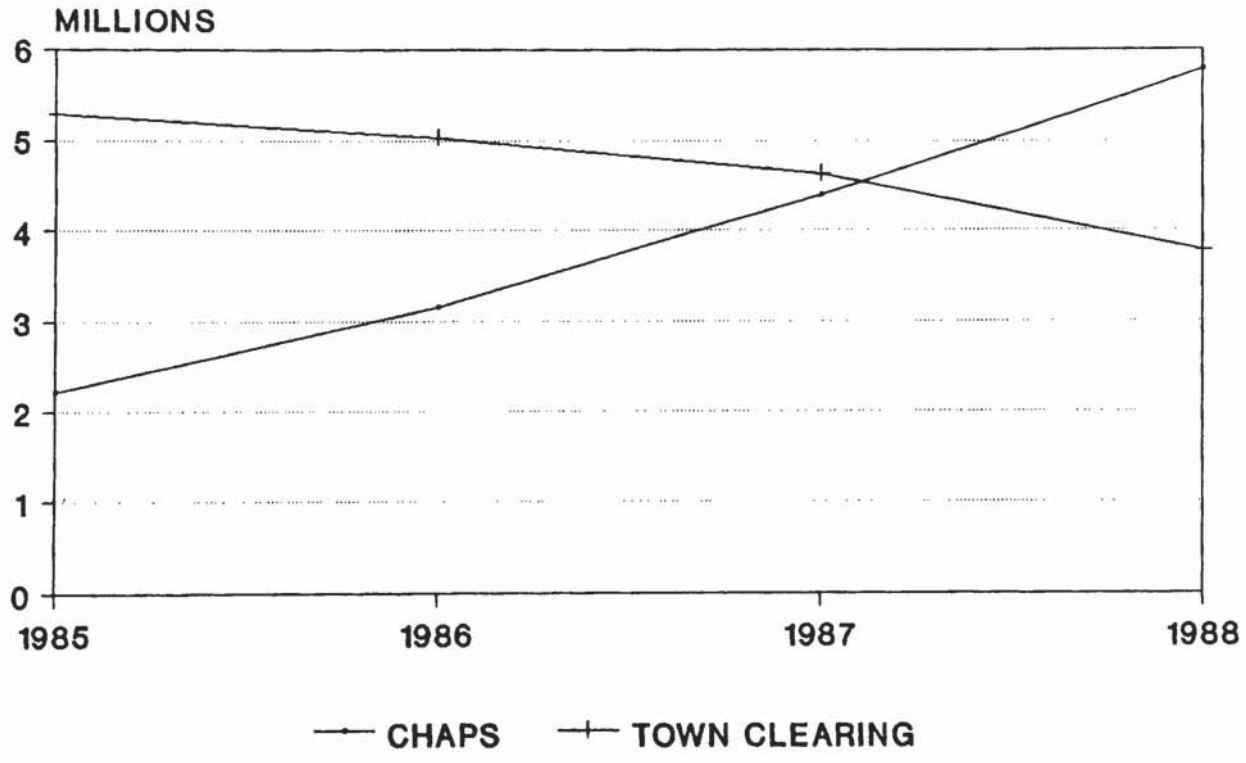
QUARTER	TOTAL 1987	TOTAL 1988	% CHANGE (1987-88)
FIRST	2,134	2,305	8.01%
SECOND	2,238	2,368	5.81%
THIRD	2,340	2,562	9.49%
FOURTH	2,309	2,327	0.78%
TOTAL	9,021	9,562	6.00%

QUARTER	TOTAL 1985	TOTAL 1988	% CHANGE (1985-88)
FIRST	1,821	2,305	26.58%
SECOND	1,891	2,368	25.22%
THIRD	1,931	2,562	32.68%
FOURTH	1,861	2,327	25.04%
TOTAL	7,504	9,562	27.43%

CHAPS vs TOWN CLEARING
NUMBER OF PAYMENTS (1985 - 1988)



CHAPS vs TOWN CLEARING
NUMBER OF PAYMENTS (1985 - 1988)



COMPARATIVE ANALYSIS: VALUE OF CLEARINGS
CHAPS VS. TOWN CLEARING
(1985-1988)

CHAPS
(CLEARING HOUSE AUTOMATED PAYMENTS SERVICES)

VALUE OF CLEARINGS
(MILLIONS OF POUNDS STERLING)

QUARTER	1985	1986	% CHANGE (1985-86)
FIRST	432,298	859,412	98.80%
SECOND	541,503	941,641	73.89%
THIRD	694,391	1,070,756	54.20%
FOURTH	687,373	1,272,068	85.06%
TOTAL	2,355,565	4,143,877	75.92%

QUARTER	1986	1987	% CHANGE (1986-87)
FIRST	859,412	1,479,010	72.10%
SECOND	941,641	1,763,537	87.28%
THIRD	1,070,756	1,977,812	84.71%
FOURTH	1,272,068	2,111,547	65.99%
TOTAL	4,143,877	7,331,906	76.93%

QUARTER	1987	1988	% CHANGE (1987-88)
FIRST	1,479,010	2,373,456	60.48%
SECOND	1,763,537	2,713,083	53.84%
THIRD	1,977,812	3,184,663	61.02%
FOURTH	2,111,547	3,017,299	42.90%
TOTAL	7,331,906	11,288,501	53.96%

QUARTER	1985	1988	% CHANGE (1985-88)
FIRST	432,298	2,373,456	449.03%
SECOND	541,503	2,713,083	401.03%
THIRD	694,391	3,184,663	358.63%
FOURTH	687,373	3,017,299	338.96%
TOTAL	2,355,565	11,288,501	379.23%

TOWN CLEARING

VALUE OF CLEARINGS
(MILLIONS OF POUNDS STERLING)

QUARTER	1985	1986	% CHANGE (1985-86)
FIRST	2,316,857	2,662,838	14.93%
SECOND	2,241,985	2,631,558	17.38%
THIRD	2,430,608	2,553,143	5.04%
FOURTH	2,204,423	2,436,147	10.51%
TOTAL	9,193,873	10,283,686	11.85%

QUARTER	1986	1987	% CHANGE (1986-87)
FIRST	2,662,838	2,583,871	-2.97%
SECOND	2,631,558	2,721,729	3.43%
THIRD	2,553,143	2,664,019	4.34%
FOURTH	2,436,147	2,642,547	8.47%
TOTAL	10,283,686	10,612,166	3.19%

QUARTER	1987	1988	% CHANGE (1987-88)
FIRST	2,583,871	2,488,702	-3.68%
SECOND	2,721,729	2,551,997	-6.24%
THIRD	2,664,019	2,563,221	-3.78%
FOURTH	2,642,547	2,262,887	-14.37%
TOTAL	10,612,166	9,866,807	-7.02%

QUARTER	1985	1988	% CHANGE (1985-88)
FIRST	2,316,857	2,488,702	7.42%
SECOND	2,241,985	2,551,997	13.83%
THIRD	2,430,608	2,563,221	5.46%
FOURTH	2,204,423	2,262,887	2.65%
TOTAL	9,193,873	9,866,807	7.32%

COMBINED TOTAL
(CHAPS + TOWN CLEARING)

TOTAL VALUE OF CLEARINGS
(MILLIONS OF POUNDS STERLING)

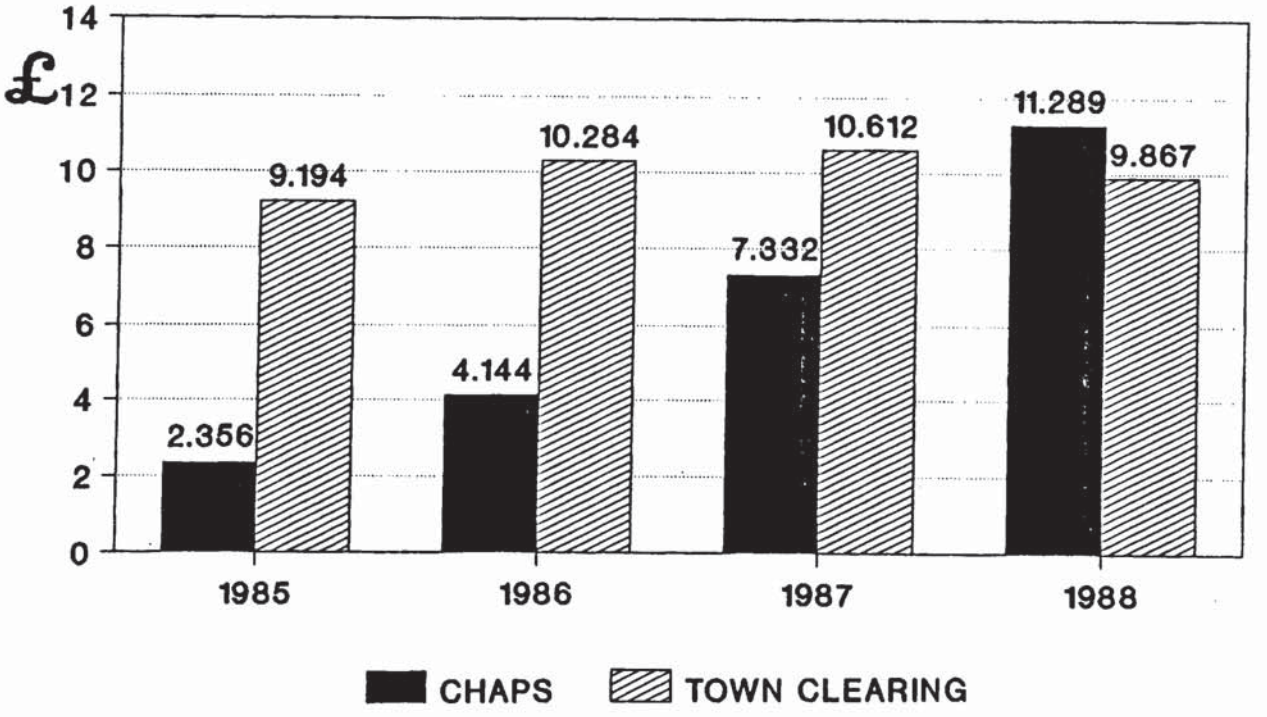
QUARTER	TOTAL 1985	TOTAL 1986	% CHANGE (1985-86)
FIRST	2,749,155	3,522,250	28.12%
SECOND	2,783,488	3,573,199	28.37%
THIRD	3,124,999	3,623,899	15.96%
FOURTH	2,891,796	3,708,215	28.23%
TOTAL	11,549,438	14,427,563	24.92%

QUARTER	TOTAL 1986	TOTAL 1987	% CHANGE (1986-87)
FIRST	3,522,250	4,062,881	15.35%
SECOND	3,573,199	4,485,266	25.53%
THIRD	3,623,899	4,641,831	28.09%
FOURTH	3,708,215	4,754,094	28.20%
TOTAL	14,427,563	17,944,072	24.37%

QUARTER	TOTAL 1987	TOTAL 1988	% CHANGE (1987-88)
FIRST	4,062,881	4,862,158	19.67%
SECOND	4,485,266	5,265,080	17.39%
THIRD	4,641,831	5,747,884	23.83%
FOURTH	4,754,094	5,280,186	11.07%
TOTAL	17,944,072	21,155,308	17.90%

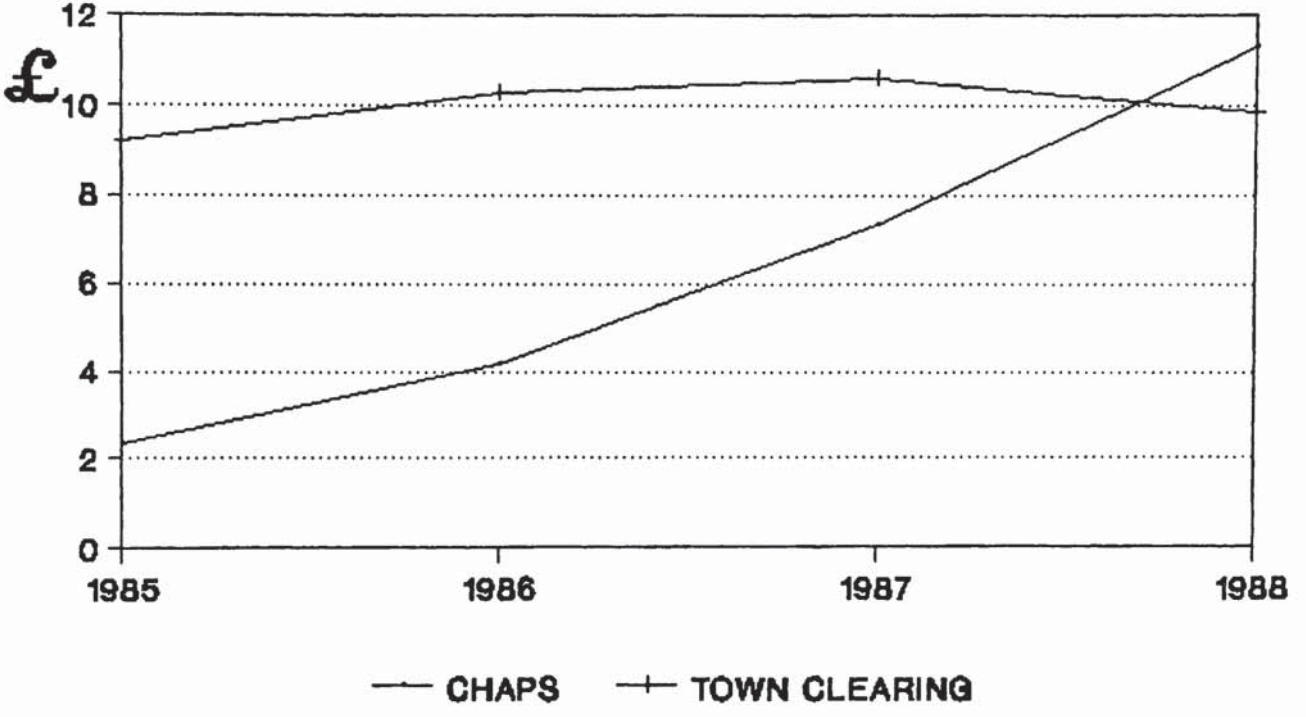
QUARTER	TOTAL 1985	TOTAL 1988	% CHANGE (1985-88)
FIRST	2,749,155	4,862,158	76.86%
SECOND	2,783,488	5,265,080	89.15%
THIRD	3,124,999	5,747,884	83.93%
FOURTH	2,891,796	5,280,186	82.59%
TOTAL	11,549,438	21,155,308	83.17%

CHAPS vs TOWN CLEARING
VALUE OF CLEARINGS (1985 - 1988)



IN TRILLIONS OF POUNDS

CHAPS vs TOWN CLEARING
VALUE OF CLEARINGS (1985 - 1988)



IN TRILLIONS OF POUNDS

CHIPS
The Clearing House Interbank Payments System

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I. INTRODUCTION

The Clearing House Interbank Payments System (CHIPS) is the world's largest electronic multilateral payments netting system run by the private sector, processing almost $1 trillion of payments daily. It is an electronic system established in 1970 to replace a paper-based check exchange located in New York. In 1990 CHIPS processed 37.3 million transactions valued at $222 trillion, primarily related to foreign exchange and offshore dollar payments.

In the late 1960's increases in interbank payments and a shift of work to late in the day for internationally oriented payments led to a Clearing House study on the feasibility of automating interbank payments. By 1970 a system was designed to transfer funds using a central computer as a switching device between participants.[1] Banks could store payment messages, often in the early evening, for release later (early the next business day), thereby leveling out peak work periods. In April of 1970, the system began live processing with nine participants.

Settlement was in next-day funds. Banks would receive notification of payments on day one, often treating them as good funds because of their confidence in the system. As a result of multilateral netting, each participant would have either one payment obligation (net debit position) or one payment receipt (net credit position), with total debits equalling total credits

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[1] This section draws on "The Clearing House Interbank Payments System (CHIPS), A Recognition of its Twentieth Anniversary, 1970-1990", pamphlet, New York Clearing House, March 23, 1990.

within the system. On the next business day, at 11:00 a.m., the Clearing House presented a paper listing the net debits and net credits ("Settlement Sheet") to the Federal Reserve Bank of New York (FRBNY) where actual entries were posted manually to the appropriate accounts. Consequently, institutions expecting payments were at risk if a participant with a large debit position failed overnight or during a weekend or a holiday.

In its first four years, hardware constraints limited CHIPS' on-line participation to 15 members. To accommodate other banks desiring access to the system, CHIPS implemented a semi-automated payment system, the Paper Exchange Payment System (PEPS). The PEPS banks communicated with CHIPS' central computer through an exchange of punched paper tapes during the day. PEPS banks then submitted end-of-day totals in paper form to the Clearing House. CHIPS' installation of a larger computer in 1974 eliminated the need for the PEPS system, and all PEPS members joined CHIPS.

Shortly after the PEPS banks came on-line, a number of additional banks applied for participation in CHIPS. By early 1980, CHIPS had 99 participants. The growing volume of activity brought CHIPS' computer to its operating capacity and forced a moratorium on adding new participants. With the introduction of more powerful computers, the moratorium was ended in 1983 and participation in CHIPS stabilized at about 140 participants until 1990 when it declined to just over 130 participants (see Appendix I for participation at year-end and annual transactions volumes).

As volume rose during the 1970's the Clearing House and CHIPS participants became increasingly concerned about overnight and over-weekend exposures generated by next-day settlement. To address this concern, CHIPS and the Federal Reserve Bank of New York designed a same-day settlement system in 1981, using a special Fedwire settlement

account on the books of the Federal Reserve Bank of New York. Since then, settlement has been made at the close of each business day by CHIPS settling participants sending and receiving Fedwire transfers through the settlement account.[2]

Following the implementation of same-day settlement, several other changes were introduced in the 1980's to monitor and reduce credit risk on CHIPS. In October 1984, a bilateral credit mechanism was implemented to control receiver risk. Each participant establishes the net amount of payments it is willing to accept from each other participant based on its own credit evaluations. These limits are enforced by CHIPS' computer.

In March 1986, sender net debit caps were installed to limit CHIPS' overall exposure to participants. The sender net debit cap was calculated as a percentage of the total bilateral credit limits extended to a participant and could not be modified during the day.

In October 1990, CHIPS implemented revised rules to provide greater assurance of settlement finality. Each CHIPS participant enters into a loss-sharing arrangement with CHIPS under which it agrees to provide a portion of the funds necessary to complete settlement should one or more CHIPS participants fail to meet its settlement obligations in a timely fashion. Each participant is required to pledge collateral in order to secure its obligations under the loss-sharing arrangement.

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[2] Currently there are 20 settling participants in CHIPS. Other participants settle through the settling participants.

Table I

Clearing House Interbank Payments System

CHIPS HIGHLIGHTS[3]

April 1970	Live processing begins with nine participants.
March 1972	Processing of Paper Exchange Payment System (PEPS) payments to CHIPS participants begins.
October 1974	PEPS is discontinued; 39 PEPS participants go on-line.
Early 1980	Capacity constraints lead to a moratorium on new participants.
October 1981	Implement shift from next-day settlement to same-day settlement.
March 1983	The 1980 moratorium on new participants is ended.
October 1984	Bilateral credit limits are introduced.
December 1985	Debit caps are implemented in a warning mode.
March 1986	Debit caps are implemented.
October 1990	Improved settlement finality with explicit loss sharing and collateral safeguards implemented.

[3] Based on "The Clearing House Interbank Payments Systems (CHIPS), A Recognition of its Twentieth Anniversary, 1970-1990."

II. ORGANIZATION

The New York Clearing House Association is comprised of eleven New York city banks, each of which is represented on the Clearing House Committee that establishes the rules for the operation of CHIPS.[4] The Clearing House Committee chooses a president who enforces the rules and oversees all operations of the Clearing House. The president can enforce these rules through his power to suspend or terminate participation in CHIPS. Appeals against the decisions of the president can be made only to the Clearing House Committee. Non-members of the NYCHA must agree to abide by CHIPS rules before being allowed to participate in the system.

At the end of 1990 CHIPS had 131 participants. Any financial institution can apply to participate in CHIPS if it meets several minimum requirements. Participants must be either a commercial banking institution or an Edge Act corporation[5] subsidiary or affiliate of a commercial banking institution and be located in New York City. Participants must be subject to regulation by the New York State Banking Department or a federal banking regulator. In addition, the parent company of an Edge Act Corporation, or an Article XII investment company as defined by New York State Banking Law, may become a substitute participant, thereby providing the greater financial strength of the parent in place of its eligible subsidiary.

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[4] The eleven banks are: Bank of New York, Bankers Trust, Chase, Chemical, Citibank, European American, Manufacturers Hanover, Marine Midland, Morgan Guaranty, National Westminster Bank USA, and U.S. Trust Co. (U.S. Trust, however, is not a participant in CHIPS).

[5] Edge Act corporations are specially chartered subsidiaries of banks. Their charter limits the business they may conduct to international transactions.

Participants must agree to transmit their messages to CHIPS through a primary connection located in New York City or a back-up connection located in the greater New York metropolitan area. In addition, an officer of the participant institution who is authorized to make binding commitments to CHIPS must be located in New York City while CHIPS is operating. Potential participants must provide CHIPS with current financial statements for themselves and any parent companies. Although an annual financial review process is not specified, CHIPS seeks to maintain financially strong participants to minimize any risks to the association and conducts an operational and financial review on a three year cycle.

III. DESCRIPTION OF CHIPS OPERATIONS

On a normal business day CHIPS operates from 7 a.m. to 4:30 p.m. (Eastern time) with settlement usually completed before 6 p.m. CHIPS closes for bank holidays as set by the Federal Reserve Bank of New York, over whose books CHIPS settles. If CHIPS is closed for a holiday, it may operate for extended hours on the next business day, beginning at 5 a.m. and ending at 5 p.m. The extended hours accommodate the additional volume generated by foreign banks that did not observe the holiday on the day that CHIPS was closed. The hours of operation may also be extended or changed by the Clearing House president.

CHIPS functions as a payments processing center which records and does the accounting for the value of messages sent to and from participants. Payment messages sent over CHIPS are credit instructions, i.e., the message tells CHIPS that it is to record a debit obligation for the sender and a corresponding credit for the receiver. All messages are initiated by the institution sending funds. The payment message includes at least the identity of the sending institution, the amount of funds to be transferred, the identity of the receiving institution

and, in most cases, the beneficiary's account identity. More information can be included if desired, which may be important to the originator to explain in detail the purpose of the payment to the beneficiary. [6]

Payment messages can be entered for immediate release or for storage within the day.[7] Payment messages are processed for immediate release unless they would cause the sending institution to exceed the risk control parameters established on a system-wide or bilateral basis as described in Section V below. Until released, messages may be deleted by the sending institution. Once a payment message is released to the receiver, it is irrevocable and represents an unconditional obligation of the sending institution. The obligation is binding regardless of error, or even insolvency of either a prior sender or the sending institution.[8]

CHIPS is a processing system with direct links to the participants and the Federal Reserve Bank of New York. Participants are of two types: settling participants; and non-settling participants, which rely upon the settling participants as correspondents to settle for them. At year-end 1990 there were 20 settling participants, 13 of which settled only for their own account

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[6] Commercial payments for shipments received are often adjusted for damaged goods or other returns. Details explaining what invoices are covered by a particular payment can be useful in completing the transaction.

[7] Until late 1987, participants could store payment messages for up to 4 days, but this option has been discontinued.

[8] When a payment is sent in error, it is left to the two participants to reach a negotiated settlement to resolve the error. There are accepted conventions as to the appropriate charges paid for errors, usually in the form of forgone interest.

and seven of which settled for as few as three or as many as twenty-six non-settling participants.[9] Of the 111 non-settling participants, 91 were US branches or agencies of foreign banks. The remaining 20 were domestic institutions.

Though the Federal Reserve Bank of New York is not a participant in CHIPS, it provides CHIPS with a special Fedwire settlement account, which is open to the settling participants only during the settlement period and which is available to them for the sole purpose of effecting settlement (see Section IV).

The CHIPS communications network is a single-node network. All participants are connected directly to a single message-switching center, CHIPS. Participants provide services in turn to third-party customers including non-participating respondent banks. Messages are often received in a pre-formatted electronic form and re-sent by the participant through CHIPS.

Each message sent through CHIPS causes the sending participant's position to be debited and the receiving participant's position to be credited. In addition, CHIPS maintains records needed to enforce its risk-management system and to provide participants with the necessary information to monitor their risk exposures. In particular, accounting information is maintained for each participant relative to every other participant and for every third-party customer of a participant that has been assigned an account identification.

The CHIPS inquiry system permits a participant to obtain the status of all of its incoming and outgoing payment messages. In addition, the participant can also obtain the status of its current net credit or debit position vis-a-vis all other CHIPS participants. Finally, a

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[9] Participants must enter into a CHIPS settlement agreement, have an account on the books of the Federal Reserve Bank of New York or another Reserve Bank, and be accepted by the Federal Reserve Bank of New York in order to become a CHIPS settling participant.

participant is permitted to obtain his net debit or credit position or that of any other participant whenever CHIPS is open.

The payments transferred on CHIPS are primarily international in nature. In June 1986 the Federal Reserve Bank of New York conducted a survey of one day's transactions on CHIPS.[10] It showed that over 82% of CHIPS' dollar volume of payments resulted from foreign exchange transactions or Euro-dollar placements. The distribution of CHIPS payments by type of transaction is presented in the following Table II.

Little information is available to provide statistics about the specific bank customers that use CHIPS to complete payments beyond estimates or anecdotal information from individual banks and the Federal Reserve survey. The survey indicated that approximately 90% of the transactions involve Eurodollar placements or foreign exchange transactions originated from offices outside the United States.[11] In the foreign exchange transactions, the transfers were concentrated on spot contracts for Deutsche Marks, Japanese yen and pounds sterling.

In recovering its costs, CHIPS acts like a co-operative. Participants pay a monthly assessment on the basis of the number of messages sent and received during the previous month. There is a minimum assessment of US $1,600 per month. This method has resulted

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[10] "A Study of Large-Dollar Payment Flows through CHIPS and Fedwire," monograph, Federal Reserve Bank of New York, December 1987.

[11] The definition of "originating outside the United States" deserves explanation. The survey respondents were instructed to treat foreign offices of all banks (including their own) as being "foreign customers" and to treat US offices of foreign banks as being "domestic customers".

Table II

Distribution of CHIPS transactions by type
(in percentages)

	Number of Transactions	Dollar Amounts
Foreign Exchange	72.6	54.9
Euro-dollar placements	16.8	27.5
Settlement	3.3	7.9
Commercial and miscellaneous	4.5	6.2
Bank Loans	1.4	1.7
Securities purchase/redemption/financing	1.0	1.4
Federal funds	0.4	0.4

in an average cost as of the end of 1990 of US $0.20 per message sent or received.[12] Consequently, a complete transaction would cost US$0.20 to the sending institution and US$0.20 to the receiving institution.

Participants also incur indirect costs for participating in CHIPS. Each participant must maintain computer and telecommunications facilities for the transmission of payment messages to and from CHIPS. In addition, an officer of the participating institution authorized to take appropriate action on behalf of the participant in connection with its CHIPS operation must be available in New York City during all hours that CHIPS is open, including any extension of normal hours past the usual 6:00 p.m. settlement. Finally, participants bear an opportunity cost for the collateral held with CHIPS.

[12] Participants are charged only 15 cents per item for transactions exceeding 80,000 per month.

IV. SETTLEMENT

CHIPS is a net net settlement or a multilateral net settlement payment system. Payment messages are sent all day but settlement does not occur until the end of the day. Participants can track both their net positions vis-a-vis each other participant and their net net position across all participants. During a normal day, CHIPS maintains the set of payment message records and at 4:30 p.m. it closes CHIPS for payment messages. By 4:35 p.m. CHIPS informs every participant of its net net position and each settling participant of the net net positions of the participants for which it settles.[13] If the net net position is negative, the settling participant is said to be in a net debit position and is required to transfer funds to the CHIPS settlement account at the Federal Reserve Bank of New York in order to settle its accounts. If the participant is a non-settling participant, then it makes this transfer indirectly through a settling participant. Settling participants in net debit positions make their transfers directly into the CHIPS settlement account at the Federal Reserve Bank of New York.

By 5:30 p.m. all the settling participants should have agreed to settle.[14] After CHIPS has been informed that all participants have agreed to settle, the settling participants in a net net debit position have until 5:45 p.m. to transfer funds into the settlement account. Once all the funds have been transferred into the account by settling participants, CHIPS, acting as

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[13] Participants are also informed of their net position with respect to every other CHIPS participant. This information can be useful in reconciling the participants' accounts with CHIPS accounts.

[14] If a settling participant is unwilling to settle the net balance of one of the participants for which it settles, the settling participant must notify the president of the Clearing House by 5:30 p.m. The president notifies the affected participant that it has one hour to arrange for either its settling participant or a new settling participant to settle its net balance. If that participant is unable to find a settling participant to settle for it, then a new revised settlement is calculated with additional settlement obligations. (See page 13.)

agent for the Federal Reserve Bank of New York, transfers funds to all settling participants in a net net credit position. As soon as the transfers are completed, CHIPS informs all participants that settlement is completed, which normally occurs before 6 p.m.

Even though the settlement is not completed until the end of the day, many CHIPS participants permit their customers receiving funds to resend those funds over CHIPS or Fedwire prior to settlement. The receiver, however, typically has an agreement with its customers that the funds received are provisional. If the settlement is not completed, the receiving bank can debit the customer's account.

Until recently the failure of a participant to settle was governed by a rule that effectively removed the failing participant from the settlement. Application of this process would "delete" that participant from the system and is sometimes referred to as a "partial unwind". CHIPS would recalculate the day's transactions but eliminate any payment messages either sent by or received by the participant that was unable to settle. Revised net positions would be calculated and reported to the remaining participants. Settlement would then proceed normally. Settling participants in a net debit position would transfer funds over Fedwire into the CHIPS settlement account. CHIPS would then transfer funds to the settling participants in a net credit position and declare the settlement complete.[15] The recalculation of the settlement would in no way relieve the participant that was unable to settle of its obligation to pay the receiving participants.

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[15] The assurance of settlement on CHIPS depends to a significant degree on the netting of payments. Parties have agreed that payments between them will be settled on a net basis, reducing the need for liquidity. There is a risk, however, that a liquidator for a failed bank might try to repudiate the netting obligation; that is, refuse immediate payment of all payment orders sent by the insolvent bank and ask for immediate payment of all payment orders sent to it. Although the likelihood of a repudiation is small, if one occurred it could be very disruptive. The Clearing House is proposing federal netting legislation that would address these risks and apply to netting in CHIPS.

There has never been a settlement failure or unwind on CHIPS. However, settlement failures have been simulated in order to test the ability of the system to implement an unwind and to determine the impact of an unwind on settlement. The results of these simulations show that an actual unwind would have been extremely complicated, with revised net positions differing substantially from original net positions.[16] Participants originally in a net credit position would have found themselves "reset" with a net debit instead. Indeed, as a result of the unwind, other participants may be unable to settle their revised positions, requiring further unwinds. Thus, the inability of one counterparty to meet its obligation when due could have prevented other counterparties from meeting their obligations, thereby generating systemic risk.

This systemic risk has been significantly reduced by bilateral limits, debit caps and CHIPS' recently implemented rules for improved settlement. The new procedure includes an explicit loss-sharing agreement and collateral that provides CHIPS with assured settlement if a single participant fails to settle.

Under the revised rules, a settling participant has until 5:30 p.m. to give notice of abnormal settlement (see Table III). If it is a non-settling participant that has caused the problem, that participant has one hour to find another settling participant that will agree to settle for it. If a settling participant is found, the Clearing House is informed and a revised settlement is struck, with reports sent to each participant affected. Each settling participant in a debit position is obligated to settle within 15 minutes after the revised balance report is made available.

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[16] Humphrey, David "Payments Finality and Risk of Settlement Failure" in Anthony Saunders and Lawrence J. White eds., Technology and the Regulation of Financial Markets: Securities, Futures and Banking, Lexington, Mass.: Lexington Books/Salomon Brothers Center Series on Financial Institutions and Markets, 1986. The simulation conducted in this study used data from a period before CHIPS implemented bilateral limits and net debit caps.

Table III

Key Times in an Abnormal Settlement

4:30 p.m	CHIPS closes for payment messages.
5:30 p.m	Notice of abnormal settlement.
6:30 p.m.	Failure to find alternative settling agent results in new settlement with ASOs.
6:45 p.m.	Deadline for settlement payments when alternative settling agent is found without ASOs (settlement completed).
7:45 p.m.	Deadline for settlement payments with ASOs (settlement completed).

If the participant has not made alternative arrangements to settle within one hour after the notice of abnormal settlement, it is treated as a failed participant. The net net debit of the failed participant is divided up into pro-rata shares,[17] known as Additional Settlement Obligations (ASO), for each remaining participant. The Clearing House informs each participant of its ASO, if any, and provides summary ASO reports to settling participants. Each remaining participant is obligated to cover its own ASO. A settling bank is obligated to settle an aggregate balance that includes the ASOs of participants for which it settles.[18]

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[17] The ASO calculation is based on the highest bilateral credit limit actually extended to the failed participant during the day for which settlement is to be made. At the time the Clearing House issues the ASO report, the failed participant ceases to be a participant, but its previous obligations continue in force until performed or legally discharged.

[18] The settling bank must also settle any ASOs of other participants for which it has agreed to make alternative settlements.

Each participant must make arrangements for settling its ASO which are satisfactory to its settling bank within one hour after the ASO balance report is sent.[19] Settling participants in a debit position are obligated to transfer funds for settlement within one hour and fifteen minutes after the ASO reports are sent out. If notice of abnormal settlement occurred at 5:30 p.m. and no alternative arrangements had been made by 6:30 p.m., the participant would be treated as failed and ASO reports would be sent out. Settlement would then be expected to occur by 7:45 p.m. The Clearing House president, however, has the power to designate other times.

Should a remaining participant fail to make satisfactory arrangements to settle its ASO with its settling participant, the settling participant will notify the Clearing House and that participant shall be in default. The Clearing House, in accordance with the CHIPS Pledge and Security Agreement, will instruct the settling participant to purchase at market value the collateral of the participant in default. The settling participant will use the proceeds to settle the uncovered ASO and transfer any remaining funds to the Clearing House for benefit of the CHIPS participant in default. The transfer of funds is to be made within one half-hour after the Clearing House sends the instruction to purchase the collateral.

If a settling participant in a debit position fails to satisfy its obligation to settle within one hour after notice of abnormal settlement, the Clearing House has several options.

- The settling participant may be treated in the same way as a nonsettling participant and become a failed participant.
- The settling participant may be required to make alternative arrangements with another settling participant to settle its net debit balance.

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[19] Under the CHIPS agreement, the failed participant is immediately obligated to reimburse each remaining participant for its ASO.

- Each participant for which the settling participant is obligated to settle may be required to make alternative arrangements to settle.
- The Clearing House may issue revised settlement or ASO reports, reflecting any changes.
- The collateral of the settling participant may be sold, using the proceeds to cover its settlement obligations.

If the procedures described above do not allow settlement to be completed, the Clearing House Committee may take whatever measures are appropriate to complete settlement. The committee cannot, however, impose an ASO liability on any participant higher than 5 percent of its maximum bilateral credit limit or any other liability in excess of that otherwise provided by CHIPS rules. The committee would place primary emphasis on completing settlement, but it may decide in extraordinary circumstances, such as when several large institutions are unable to settle at the same time, that an orderly settlement is not possible. This might occur if there were an act of God, such as a major earthquake. In such a case, all payment messages would be returned to storage, effectively unwinding the entire settlement.[20]

V. RISK MANAGEMENT

A. KEY RISKS

Risk controls implemented by CHIPS improve the finality of payments. The higher the degree of finality of payments in a large value payment system, the less will be the systemic risk faced by participants. Finality may be thought to require three characteristics: payments must be irrevocable when entered; the settlement of payment obligations must be timely; and

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[20] The underlying obligations between the originator and beneficiary would not, however, be extinguished.

the settlement must be irreversible and extinguish the individual obligations going into it. To the extent that resources of other participants are relied upon to achieve settlement, there must be a clear determination of which parties bear any loss and whether there are sufficient resources available to absorb the loss. Liquidity problems can jeopardize the timeliness of settlement, while failures to limit credit shocks can result in severe losses and undermine the ability of the system to continue functioning.

CHIPS' risk management is built upon bilateral credit limits that each participant establishes vis-a-vis each other participant.[21] Participants use bilateral credit limits to manage their counterparty risk, while the net debit cap limits the aggregate liquidity demand on any CHIPS participant. In addition, the recently adopted loss-sharing arrangement, based on participants' bilateral credit limits, and paid-in collateral strengthen the system's ability to manage credit risk and improve settlement finality.

Credit and liquidity risk are generated throughout the day as participants extend credit to each other. Under CHIPS' rules once a payment is released, it is irrevocable by the sending participant, addressing the first of the three characteristics for finality listed above. The receiving participant accepts the payment message realizing that it will not receive funds until settlement is completed at the end of the day.[22] Intraday credit is essential to the operation of CHIPS. All participants begin each day with a zero balance and the debit and credit for each

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[21] The rules of the Clearing House, Article 4A of the U.C.C. and the irrevocability of payments in CHIPS make up the basic framework within which credit risk in CHIPS is managed. Because one funds transfer may require several payments, through intermediaries at different times, it is essential that participants bear the risk of loss in the event that one participant becomes insolvent. Article 4A provides rules which indicate which parties are to bear the losses in systems such as CHIPS. (See "Basic Concepts in Article 4A: Scope and Definition" by Patricia B. Fry and "Settlement Obligations and Bank Insolvency" by Norman R. Nelson in The Business Lawyer, June 1990 Vol. 45 No. S.)

[22] A participant could minimize the risk of extending this intraday credit by treating the credit as provisional and not permitting its receiving customer access to the funds until settlement is final. Competitive pressures have, however, resulted in a common practice of permitting receivers access to the

payment message are posted simultaneously. In such a system, no transactions could occur unless at least some credit were available, i.e., a willingness to accept payment messages.[23]

The level of intraday credit within CHIPS is the sum of the aggregate debits of all participants in a net debit position vis-a-vis the system. During the day this level rises and falls depending on the flow of payment messages. During a two-week period in October 1990 the maximum level of intraday credit ranged between $28 billion and $39 billion. At 8:15 a.m. on an average day during this two-week period nearly $16 billion of intraday credit had been extended, rising through the morning to almost $30 billion at 11:00 a.m. and then declining smoothly to $18 billion at 5:00 p.m.[24] Further netting at the level of the settlement banks brought the average settlement amount over this two-week period to just over $7 billion. (See Table IV on page 20 for more complete data on intraday credit.)

CHIPS faces end-of-day liquidity risks as well as intraday risks. If a participant cannot settle its obligations in a timely manner, the entire settlement could be disrupted, leaving other participants without funds they were planning to use outside the system. Many of the controls for credit risk also help limit liquidity risk.

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[23] Often referred to as "grease", this credit represents the willingness of participants to accept payment messages based on the assumption that the sender will cover any net debit obligations at settlement. Such credit does not appear on any balance sheets and is not bound by legal lending limits.

[24] The Federal Reserve calculates the daylight overdraft level of CHIPS as the sum of the maximum net debit positions of each participant during the day. In September 1988 the average level of intraday interbank lending credit within CHIPS was US$45 billion. The comparable credit extended over the Federal Reserve System's Fedwire funds transfer network was US$55 billion.

Liquidity risk among CHIPS participants is managed in several ways. The first line of defense to limit liquidity risk is to require participants to maintain a reasonable level of liquidity. The Clearing House president has the power to review the financial statements of a participant and to require that the participant improve its liquidity if it is perceived that there is any problem. A second line of defense is to avoid unexpected demands on liquidity. The CHIPS system provides an on-line, real-time inquiry system that permits a participant to monitor its position and potential need for liquidity constantly. It also permits a settling participant to monitor the net positions of the participants for which it settles. Thirdly, since 1986, the maximum amount of liquidity needed by a participant is constrained by a CHIPS-imposed limit (the net debit cap) on the maximum net debit position allowed for that participant. Furthermore, CHIPS requirements for reliable back-up systems help minimize the liquidity risks that might result from operational failure (see Section VI).

The primary source of liquidity for CHIPS participants is the Federal funds market. The depth of the Federal funds market in the United States provides a large pool of liquidity.[25] Under its revised rules, the collateral held with CHIPS to cover the ASOs is a source of liquidity, although any such use of this collateral would be considered extraordinary.

B. SAME-DAY SETTLEMENT

Until 1981, CHIPS' settlement was accomplished in next-day funds. At the end of each day, participants would receive balance positions for settlement. On the next business day at 11:00 a.m., the Clearing House presented a settlement sheet to the Federal Reserve Bank of New York. The actual entries were then posted manually to the participants' accounts at the

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[25] For some CHIPS participants, adjustment credit might, under certain circumstances, be obtained from the Federal Reserve's discount window.

Table IV

Aggregate Intraday Interbank Credit Extended over CHIPS*
(average of total net credit positions over the period
10th October to 31st October 1990)

TIME	AMOUNT (in millions of US dollars)
8:15 a.m.	15,898
9:00	23,297
10:00	27,138
11:00	29,699
12:00 noon	27,997
1:00	26,944
2:00	25,081
3:00	23,453
4:00	20,072
5:00	18,344

* *The New York Clearing House Association.*

Federal Reserve Bank of New York. Thus, transactions were not final until the end of the next business day. Institutions expecting payments were at risk if a participant with a large debit position failed overnight or during a weekend or holiday. Receiving banks could only provide their customers with provisional funds until after settlement on the next business day.

The next-day settlement extended the risk for foreign exchange participants buying dollars in exchange for European or Far East currencies. This risk was highlighted in 1974 when the Herstatt bank, a West German commercial bank, was declared bankrupt in the afternoon of the European business day. Firms that had purchased U.S. dollars from Herstatt Bank in exchange for European currencies had delivered their European currencies in Europe before

bankruptcy was declared, but could not receive dollars in New York because Herstatt's operations had been suspended. Although some of these banks recovered their losses through the courts, others were not able to do so.

In a first step towards same-day settlement, the manual presentation of the settlement sheet was replaced by on-line Fedwire payments in 1979. After all settling participants had agreed to settle CHIPS, debtor settling participants sent Fedwire payments to creditor settling participants. As soon as all the creditor settling participants acknowledged receipt of the Fedwire settlement payment, the Clearing House broadcast to all participants that CHIPS was settled. This typically occurred at 12:00 noon on the following business day.

In October 1981, CHIPS shifted to same-day settlement, and thereby reduced the hours of credit exposure and improved the finality of CHIPS payments, and also eliminated distortions arising from overnight and weekend float.[26] Under the new procedures, which are still in place, a special Fedwire settlement account was established at the FRBNY for the sole purpose of settling CHIPS. The account is only opened after all participants have agreed to settle. Each debtor sends only one Fedwire payment to the CHIPS settlement account at the FRBNY, rather than the multiple direct payments from debtor to creditor participants. When the settlement account is fully funded CHIPS disburses the funds via a Fedwire payment to each of the creditor settling participants. The settlement account is then closed and all CHIPS participants are notified that CHIPS is settled.

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[26] The shift to same-day settlement reduced temporal risk, but did not eliminate the risk of the U.S. dollar payments resulting from settlement of European currencies during the European business day and the CHIPS settlement of the U.S. dollar payments at the end of the U.S. business day.

C. BILATERAL CREDIT LIMITS

Bilateral credit limits, implemented in 1984, allow each participant to limit its exposure to every other participant by a series of bilateral limits on the maximum net amount of payments it will accept from any other participant. Each participant provides CHIPS with the bilateral credit limits it has established for all other participants in the system. A participant's bilateral net credit limit can be reduced at any time and increased up to 20 times the amount of collateral the participant holds with CHIPS [27] and can differ for every participant based upon credit evaluation and needs. As a practical matter, these bilateral limits can be set at zero and sometimes are for smaller participants.

Since the bilateral net credit limit is set by each participant, the participants can enter into private agreements to limit risk further or to accommodate another participant's needs. For instance, a riskier participant may provide collateral to another participant in order to have a higher limit. The collateral may take the form of compensating balances. Alternatively, it is not unusual for a very sound participant to reach its bilateral credit limit with respect to another participant for some reason such as a large infrequent payment. In these cases, the participant extending the credit can, at its discretion, temporarily increase the bilateral credit limit in order to facilitate transmission of the payments. [28]

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[27] Reductions in bilateral limits during the day, however, do not lead to reductions in ASOs. See Section E for more information about collateral.

[28] However, the payment will still not be executed if it would cause the sender to exceed its net debit cap (see next section) and the increased credit limit cannot exceed the participant's highest bilateral credit limit covered by collateral with CHIPS.

D. NET DEBIT CAPS

Although bilateral credit limits offered a defense against a bank's exposure to other participants on a bank-by-bank basis, individual banks could still generate unacceptably high aggregate debits and in 1986 net debit caps were implemented to limit a participant's net debit position in the overall system. The cap is a function of the bilateral credit limits extended to a participant by the other participants. The formula is five percent of the sum of all bilateral credit limits extended to a participant by other CHIPS participants and is set each morning at 7:00 a.m.[29] If other participants feel that an institution has become riskier, they can immediately lower their bilateral credit limits and, unless they later raise the limits, the next day the net debit cap will be lowered. More often, a participant will raise its bilateral limits during the day to facilitate the flow of payments and lower the limits later in the day. The caps limit the risk exposure of all CHIPS participants collectively to a single participant and improve the system's ability to effect a timely settlement.

CHIPS monitors all transactions against these caps and bilateral limits constantly. If a payment message is sent that would exceed a cap or limit, CHIPS does not allow the message to be processed. The message can be stored until the net positions change sufficiently to permit the payment to be sent without violating the cap or limit, causing the payment to be rejected to the sender to be resent. This real-time monitoring is extremely effective, because credit risk is primarily a problem of the unexpected failure of a participant.

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[29] In 1990 the formula was simplified to 5 percent, while a $1 billion limit on the maximum bilateral credit limit was removed.

E. LOSS-SHARING AND COLLATERAL

In October 1990, loss-sharing and collateral agreements were implemented to improve CHIPS' settlement finality. These established a well-defined system for completing settlement in the event of one or possibly two or three or more participants failing to settle. Under the revised rules, the loss-sharing obligation of each participant is explicit, with collateral posted to assure settlement in the event it is needed to satisfy the loss-sharing obligation. These rules, with the participants' collateral, increase the assurance that settlement will be timely and irreversible, addressing the second and third characteristics of finality that were given in Section A.

Until these measures were implemented, CHIPS' first line contingency plan for the inability of a participant to settle a debit position was a deletion (partial unwind) of the participant from the settlement calculation or a total unwind. As noted in Section IV, even a partial unwind could lead to significant systemic risk.

Under the revised rules, each participant must enter into a loss-sharing agreement which will govern the allocation of losses if a participant fails to settle. Each participant agrees to pay an additional settlement obligation if a participant fails to settle, with all of the ASOs equalling the net net debit balance of the failed participant. In the case of only one failed participant, each remaining participant's ASO is equal to:

> the net net debit balance owing by the failed participant multiplied by a fraction, the numerator of which is the highest bilateral credit limit that was granted by the remaining participant to the failed participant during the day for which settlement is to be made and the denominator of which is the sum of all of the highest bilateral credit limits that were granted by all remaining participants to the failed participant during that day.[30]

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[30] "CHIPS Settlement Finality Rules and Documents", New York Clearing House Association, Page

In the case of multiple failed participants, a similar formula is used to allocate losses with the following limitations. The total ASO of each remaining participant may not be greater than 5 percent of the remaining participant's maximum bilateral credit limit. In addition, the ASO of a remaining participant calculated with respect to any single failed participant may not exceed the highest bilateral credit limit extended by the former to the latter. In the event that the above limitations do not allow sufficient funds to be raised to cover the initial settlement obligations of the failed participants (when there are multiple failures), the Clearing House may seek to determine whether any other participants would be willing to make up the shortage.

Under the revised rules for settlement finality, each participant is also required to post collateral to cover its largest potential ASO for any single participant. This is equal to five percent of the highest bilateral credit limit granted by the participant to any other participant. CHIPS will not allow a participant to increase any of its bilateral credit limits during the day above 20 times the value of the participant's posted collateral. Collateral can, however, be added during the day, or withdrawn if it exceeds five percent of the participant's highest intraday bilateral credit limit.

The collateral posted is in U.S. Treasury bonds, notes or bills in book-entry form to be held in a CHIPS collateral account at the FRBNY.[31] Participants enter into a pledge and security agreement granting the Clearing House, as agent for CHIPS, security interest in the collateral. Participants send securities free of value to the collateral account, while withdrawals can only be instructed by CHIPS. Both deliveries and withdrawals can occur whenever the Fedwire securities system is open, subject to CHIPS control. Each participant's securities are held in a subaccount of CHIPS' account. Participants without book-entry accounts at the FRBNY

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[31] In late 1990, participants held slightly over $3 billion in collateral with CHIPS.

use pass-through correspondents. If a remaining participant (after one participant has already failed) cannot cover its ASO, its collateral is sold to the participant's settling bank and the proceeds are used to meet its ASO, as described in Section IV.

VI. OPERATIONAL CONTINGENCY

From its beginning in 1970, CHIPS has put a heavy emphasis on systems reliability and contingency planning.[32] Adequate contingency plans and back-up systems provide an essential defense against liquidity risks that might be caused by operational failure. CHIPS currently has a same-day recovery ability so that, in the event of a disruption, the day's work can resume at the contingency center within 10 minutes.[33] Contingency requirements for the largest participants in CHIPS are being phased in. Each of these participants is also required to have same-day recovery capabilities.

CHIPS requires each participant to maintain both a primary and a back-up computer for its connection to CHIPS. Each participant's primary site is connected directly to both the primary CHIPS processing site and the back-up CHIPS site. All connections are through high-speed lines and communication multiplexers with "dial back-up" lines offering yet another level of redundancy.[34]

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[32] This section draws on Clearing House Interbank Payments System, by the New York Clearing House, March 23, 1990.

[33] CHIPS uses "remote data base shadowing" at a back-up site to log the messages sent on its primary system. CHIPS also maintains two overlapping independent communications networks to connect participants to the CHIPS computer.

[34] CHIPS also has extensive contingency plans. In the event of a power failure, CHIPS has a battery-based reserve and a dual diesel generator system to generate its own electrical power as needed. CHIPS was not directly hit by the power outage in August 1990, although some of its participants were.

During 1989, there were no operational problems on CHIPS that led to delays in CHIPS closing, although participants' problems did delay the closing at times. System reliability has consistently improved and in 1990 up-time performance was 99.92%.

Within a year of going live, CHIPS added a second computer (B-3500) to provide assurance of continuous operation and flexibility as payment transactions increased (see Table V). In 1974, the installation of a Burroughs B-6700 computer in a new data center at a downtown site greatly increased capacity and allowed some 40 new participants to go on-line. After a moratorium on new participants in the early 1980's, the main CHIPS computer center was relocated to a mid-town site and state-of-art computers, Burroughs B-7800, were installed. These became operational in 1982 and the downtown site was upgraded to a B-7800 and maintained for back-up and testing purposes.

The main computer's disk files and pertinent documentation had to be transported manually to the back-up site in order to initiate the recovery process. This procedure required several hours. In the next few years volume soared, and computer and communications technology matured dramatically. The Clearing House replaced the B-7800s with a multi-processor UNISYS A-15 configuration in 1987. The upgrade substantially increased speed, reliability and reduced maintenance and power/air conditioning demands. Six months later, a second multi-processor A-15 computer was installed in a newly constructed back-up center in New Jersey.

In August of 1989, the back-up A-15 became a hot back-up site through the installation of high speed data lines connecting both computers and with software modifications. Recovery time was reduced to a few minutes, the time necessary to switch the data lines

Table V

Clearing House Interbank Payments System
Computer Support and Contingency Plans[35]

April 1970	CHIPS starts operations with Burroughs B-3500.
February 1971	A second Burroughs B-3500 is installed.
August 1972	CHIPS leases a downtown data center to house dual processor Burroughs B-6700.
December 1973	Delivery of Burroughs B-6700 for installation at the new downtown data center.
October 1974	B-6700 becomes operational, with 39 PEPS participants on-line.
February 1977	Install third processor on B-6700.
June 1981	Lease mid-town site for new data processing center.
July 1982	Burroughs B-7800 becomes operational at mid-town site. The downtown site is upgraded to B-7800 for back-up and testing.
April 1987	Off-site back-up facility established in New Jersey.
June 1987	Implement automated recovery process in CHIPS computer.
December 1987	UNISYS A-15 computer is operational, replacing Burroughs B-7800.
June 1988	Back-up UNISYS A-15 computer installed in New Jersey.
August 1989	Primary and back-up computers are connected together to provide "hot back-up" in New Jersey.

[35] Source: "The Clearing House Interbank Payments System (CHIPS), A Recognition of its Twentieth Anniversary, 1970-1990", pamphlet, New York Clearing House, March 23, 1990.

connecting all participants to the main computer over to the back-up computer. Payment messages stored in the main computer are simultaneously stored in the back-up computer.

VII. AUDIT AND OVERSIGHT

Supervisory oversight of CHIPS is the joint responsibility of the Federal Reserve System, the Federal Deposit Insurance Corporation, the Office of the Comptroller of the Currency and the New York State Department of Banking. CHIPS has been examined annually on a joint basis every year since 1979. The Clearing House has cooperated in these examinations.

Not only is CHIPS examined, but all the CHIPS participants are examined as depository institutions. One of the requirements of a CHIPS participant is that it be subject to regulation by the New York State Banking Department or a federal banking regulator. As a result, the financial condition and operational integrity of each participant is reviewed on a regular basis by one or more bank supervisors to ensure the safety and soundness of the institution. These examinations typically include reviewing wire transfer operations including links with CHIPS.

The Clearing House, as the operator of CHIPS, also closely monitors CHIPS operations. As an association, the members that control CHIPS are also users of CHIPS. As such, they have a vested interest in guaranteeing that CHIPS continues to operate smoothly.

In addition to the Clearing House monitoring of the financial health of the participants, all the participants have an interest in monitoring the financial condition of all other participants that might send payments to them. Each participant must evaluate the financial

condition of each other participant when it determines the bilateral credit limits it will extend to that participant. The bilateral limits offer perhaps the most dynamic form of financial review, since they can be changed by a participant at any time in order to protect itself vis-a-vis other participants. Such changes are not subject to any appeal process.

Appendix I

CHIPS
Annual Transactions Volume and Participants
(1971-1990)

	Transfers Originated (Millions)	Dollar Value (Trillions of Dollars)	Year-end No. of Participants
1971	0.8	$1	15
1972	2.0	5	15
1973	2.7	9	15
1974	3.5	11	56
1975	6.0	11	63
1976	7.1	13	69
1977	8.2	16	77
1978	9.6	20	80
1979	10.9	27	92
1980	13.2	37	100
1981	15.9	40	99
1982	18.6	53	99
1983	20.2	60	117
1984	22.8	69	138
1985	24.9	78	142
1986	28.5	106	140
1987	31.9	140	139
1988	34.0	165	139
1989	36.5	194	140

Trading of Foreign Currency
Options and Futures in Philadelphia

SUMMARY

The Philadelphia Stock Exchange (PHLX) is the most active marketplace in the U.S. for the trading of options for the delivery of foreign currency.[1] Both American-style and European-style options on seven foreign currencies plus the European currency unit are offered.[2] In 1988, a total of 9.9 million contracts were traded, with an average daily value of the underlying currency of $1.6 billion. (On one peak day during the year, $4.5 billion of underlying was traded.) Firms who wish to trade foreign currency options on PHLX must become Foreign Currency Participants. There are 204 such firms, 160 of them members of PHLX itself and 44 non-members.

The Philadelphia Board of Trade (PBOT), a subsidiary of PHLX, is a marketplace for foreign currency futures trading. It is fairly inactive, with only 1,385 contracts traded in 1988.[3]

Trading on both exchanges is by open outcry. The trading crowd on PHLX consists of a specialist, registered options traders (ROTs), and floor brokers. The crowd on PBOT consists of a board official, registered commodities traders (RCTs), and floor brokers. Specialists and ROTs on PHLX make markets in options; RCTs, or locals, on PBOT provide liquidity in futures. (The only responsibilities of PBOT's board officials are to execute limit orders and to maintain order in the crowd.) PHLX's market-makers are required to trade only "to a reasonable degree under existing circumstances."

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[1] The Chicago Mercantile Exchange trades options on foreign currency futures.

[2] American-style options can be exercised at the buyer's option anytime prior to expiry. European-style options can be exercised only upon expiry. Only American-style options are available on ECU.

[3] PHLX is regulated by the SEC; PBOT is regulated by the CFTC.

Three firms handle most of the specialist activity: Tague Securities (Deutsche marks and Japanese yen), Drexel Burnham Lambert (British pounds and Swiss francs), and Salomon Brothers (night trading in all currencies). A subsidiary of one bank, Marine Midland, is a specialist in Canadian dollar options. Under safeguards, including maintaining separate organizational structures and Chinese walls, affiliates of specialists may trade in those options in which the specialist is registered.

PHLX has a day and an evening session. The trading "day" begins at 6:00 p.m. EST/7:00 p.m. EDT with the evening session and continues, with a break for sleep, until 2:30 p.m. the following afternoon. In January 1989 PHLX moved its daytime opening hour back to 4:30 a.m. in order to capture more trading from European customers, who accounted for perhaps two-fifths of all its trading.

Trades are compared on the floor of the exchange. Unmatched trades are expected to be reconciled within approximately one hour of the end of trading. (The absolute deadline for reconciling unmatched trades is 8:30 a.m. the next morning.) Matched trade data are sent to the Options Clearing Corporation (OCC) in Chicago at approximately 4:30 p.m. Eastern time. Using its "International Clearing System," OCC then generates reports of positions, exercises, and assignments of exercises at approximately 6:30 p.m. (Eastern time), which is just prior to the commencement of trading in PHLX's night session in the summer, but after commencement in the winter. Margin reports are not prepared until 8:00 a.m. the following morning. Margin is called at 10:00 a.m. that morning. This means that the clearinghouse is exposed to its members for an extended time after the following trading day has begun: two hours after the pre-1989 start of the morning session (i.e. before the extension of morning hours) or 15-16 hours after the start of the official trading "day" in the evening session.

Approximately a third of the contracts result in delivery of currency. This appears to be a very high proportion, compared to deliveries under futures contracts.

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Trading of Foreign Currency Options and Futures in Philadelphia[1]

The Philadelphia Stock Exchange (PHLX) is one of two active marketplaces for foreign currency options in the United States.[2] A subsidiary, Philadelphia Board of Trade (PBOT), provides a marketplace for foreign currency futures. This paper discusses these two exchanges.

I. Market Development

Commodities derived from foreign currencies are used to hedge exchange rates in international lending, investment, and commerce. They came into vogue when nations adopted a system of floating exchange rates in 1971. The International Monetary Market (IMM), now a division of the Chicago Mercantile Exchange (CME), led the way with futures contracts on five currencies in May 1972. PHLX introduced the United States' first traded currency option, that based on the British pound/U.S. dollar exchange rate, on December 10, 1982, and four additional options--those based on the Japanese yen, the Swiss franc, the German mark, and the Canadian dollar--over the ensuing two months. Options based on the French franc, European currency unit (ECU), and Australian dollar were introduced later. (CME came back with its own options in 1984.)

Of options trades originating off the exchange floor, perhaps 95 percent are placed by banks, pension funds, and other

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[1] Mr. Paul J. Adair and his colleagues at the Philadelphia Stock Exchange generously provided information for and comments on this paper. Any remaining errors are the writer's responsibility.

[2] The other is the Chicago Mercantile Exchange. PHLX trades options for delivery of currencies; CME trades options for delivery of foreign currency futures.

institutional participants; the remaining 5 percent are placed by corporations and individuals. The major players use options to offset risks inherent in holding asset portfolios denominated in foreign currencies. They also use options to hedge transactions risks. While futures are just as or more suitable than options for hedging asset portfolios (much depends on precisely what the participant wants to do), options are usually more suitable for hedging transactions that are not certain to occur. By purchasing an option, the buyer risks no foreign exchange exposure if the contemplated transaction falls through. Alternatively, a corporation might purchase a custom-made option from a bank, rather than using a standardized exchange-traded instrument. In this case, the bank could offset part of its risk by trading in the standardized tools. Participants in the markets can also use options (as well as futures) to speculate on changes in exchange rates.[3] However, the amount of institutional speculative interest in the currency markets is not believed to be yet as great as it is for other instruments, e.g., interest-rate and stock-index instruments.[4] (This may change.) In addition, market-makers may trade among themselves and also arbitrage price discrepancies across markets. Approximately 10 percent of the volume represents trades between market-makers, based on a recent sample undertaken by the exchange. Approximately half of the trading is initiated by foreign customers, primarily European.

After growing rapidly from 3.7 million contracts in 1985 to 10.5 million contracts in 1987, PHLX options volume leveled off

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[3] The relative amount of speculative vs. hedging interest is indicated by the activity in the various maturity series. Short-term traders focus on the shorter maturities; holders of extended maturities tend to be hedgers.

[4] John G. Powers, "FX: New Faces, New Places," Intermarket, vol. 5 (June 1988), p. 35.

at 9.9 million contracts in 1988.[5] The currency underlying the contracts in 1988 averaged $1.6 billion daily. Open interest averaged 889,000 contracts (based on month-end data). The three leading European currency contracts--Deutschmark, British pound, and Swiss franc--accounted for 60 percent of the 1988 volume, while the yen option accounted for 30 percent (Exhibit I). Futures volume on PBOT was relatively minuscule, 1,385 contracts in 1988, down sharply from 10,993 contracts in 1987 and less than a tenth of the volume in 1986, the exchange's first year.

The record (as of year-end 1988) one-day trading volume was set on July 15, 1988, when 113,722 contracts were traded. These trades, representing an underlying value of approximately $4.5 billion, occurred on a day when trade deficit figures were announced and which was the last trading day for all options with a July expiry. The previous record, set on October 29, 1987, was 105,976 contracts.

The volume of trading depends on customer demand--which increases when exchange rates become more volatile--and competition with other exchanges. In the U.S., PHLX's options contracts, which require the delivery of cash when exercised, compete with CME's options, which require the delivery of a futures contract. CME's options contracts have the advantage over PHLX's in that less cash--only a futures margin--is required upon exercise of the option, rather than the full settlement amount. Thus it is easier for small traders, with limited resources, to deliver on a futures option than on a cash option.[6] More importantly, CME's contracts

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[5] Currency options constituted 36 percent of all options traded on PHLX in 1987, up from 33 percent in 1986 and 20 percent in 1985. Options on equities constituted the majority of PHLX options in all years.

[6] Brian Gendreau, "New Markets in Foreign Currency Options," in Federal Reserve Bank of Philadelphia, Business Review (July-August 1984), p. 9.

can be cross-margined with its futures, resulting in lower costs for customers. To counter this competition, PBOT (established in 1984) added currency futures to its offerings in July 1986, thereby enabling PHLX/PBOT to compete more effectively with CME.[7]

CME witnessed more currency options trading in 1988 than PHLX, but reported lower levels of open interest. It reported trading 7.6 million contracts, but each contract was twice the size of PHLX's; on a comparable basis, CME traded 15.2 million contracts, 54 percent more than were traded on PHLX. PHLX's average open interest, however, was 11 percent greater than CME's, once contracts are adjusted for size. This suggests that in 1988, at least, CME was more of a trader's market while PHLX was more of an end-user's market. In addition, the IMM division of CME reported trading 21.5 million futures, each of a size double that of PHLX's options and the same as that of PBOT's futures.

For two years, PHLX had one other domestic competitor, the Chicago Board Options Exchange (CBOE). CBOE traded European-style options--which can be exercised only upon expiration--while PHLX traded American-style options--which can be exercised anytime prior to expiry. However, CBOE ran a poor third to CME and PHLX.[8] In August 1987 CBOE transferred its contracts to PHLX and exited the market. The next month PHLX revised the terms of CBOE's former contracts to make them identical to its own, save for the style of

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[7] Until recently, PHLX options and PBOT futures could not be cross-margined due to a host of legal and regulatory factors. PHLX's options trading is regulated by the Securities and Exchange Commission (SEC), while PBOT's futures trading is regulated by the Commodities Futures Trading Commission (CFTC). Now, however, securities and commodities firms can cross-margin trades for their own accounts. CME has no similar regulatory problem: its futures and options are both regulated by CFTC.

[8] CBOE traded 455,000 currency options in 1986. Adjusted for the size of the contracts, this was equivalent to 11.4 percent of PHLX's volume in that year. Intermarket (February 1987).

exercise. These options comprised 4.1 percent of PHLX's total currency options trading volume in 1988.

Several foreign exchanges also trade currency options: the European Options Exchange, the International Stock Exchange (ISE--London), London International Financial Futures Exchange (LIFFE), Singapore International Monetary Exchange (SIMEX), and a few additional exchanges dealing in their national currency. In 1984-85 PHLX discussed potential link-ups with LIFFE and Hong Kong Commodity Exchange in order to enable round-the-clock trading, but nothing came of these discussions.[9] Subsequently, PHLX helped ISE establish copies of its British pound and Deutsche mark options in London.[10]

In September 1987 PHLX instituted a night trading session to facilitate usage of PHLX instruments by market participants in the Far East. Initially, only the Deutsche mark, yen, and Australian dollar contracts were traded in the evening; subsequently, the British pound and Swiss franc were added. (PBOT has evening sessions on the same five currencies.) Effective from Sunday through Thursday, the evening hours are set to correspond to 8:00 a.m. to 12 noon Tokyo time--6:00 p.m. to 10:00 p.m. EST or 7:00 p.m. to 11:00 p.m. EDT. This evening trading accounted for 12.3 percent of PHLX's total currency options trading volume in 1988.[11] Beginning on January 20, 1989, PHLX moved its opening hour

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[9] International Financing Review, no. 118 (February 2, 1985), pp. 12-13.

[10] There was some serious discussion about establishing a link-up between ISE and PHLX to enable positions created in one country to be transferred to the other. These talks have been terminated.

[11] Japanese participants alone accounted for nearly half of the trading during the evening session, based on data for the twelve months from September 16, 1987, to September 16, 1988. International Financing Review, no. 744 (October 1, 1988), p. 3221.

back from 8:00 a.m. to 4:30 a.m. in order to garner more European business, which is currently being executed in the OTC market. As the CME is also attempting to increase its share of the European market by developing an off-hours trading system, Globex, in conjunction with Reuters Holding plc, PHLX and the CME will thus extend their competition. (PHLX's early-morning opening corresponds to 9:30 a.m. in London.)

Further down the road, PHLX is looking into the trading of non-standardized, ad hoc options such as those common in the interbank market. It is uncertain what, if anything, will develop along these lines.

II. Contract Specifications

Foreign currency options give the buyer the right, upon exercise, to buy (in the case of calls) or sell (in the case of puts) a specific amount of foreign currency in exchange for U.S. dollars. The seller, when called upon to honor the option contract, must deliver or receive (as the case may be) the corresponding amount of foreign currency. In the case of futures, the buyer is obliged to receive the foreign currency, while the seller is obliged to provide it.

Initially, all of PHLX's options could be exercised anytime prior to expiry; this is known as "American-style" exercise. When PHLX took over CBOE's currency options business, it offered "European-style" options also, e.g., those that could be exercised only upon expiry. (European-style options are available for all currencies except the ECU.)

The conditions of trading are specified by the rules of the exchanges. PHLX options and PBOT futures have many terms in common. All are traded between 4:30 a.m. and 2:30 p.m. during the day; the more popular ones are also traded between 6:00 p.m. and

10:00 p.m. EST or between 7:00 p.m. and 11:00 p.m. EDT at night.[12] Six monthly contracts in each currency are traded at any one time: those settling in the nearest three months and those settling in the subsequent three calendar quarter-ends. The latest settlement day for options (the delivery day for futures) is the third Wednesday in expiry (delivery) month. All contracts cease trading on the Friday before the last settlement (delivery) day. Position limits are 100,000 contracts for options on each side of the market and 6,000 contracts for futures.[13] There are no price limits.[14]

The options contracts differ in their amount of underlying foreign currency, price quotations, minimum price movements (or ticks), and exercise price intervals (Exhibit II). All ticks are worth either $5.00 or $6.25, except for that on the British pound contract, which is worth $3.125. The most recent contract modification concerns that on British pounds; its size was increased to £31,250 from £12,500, effective September 18, 1988.

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[12] Under unusual market conditions, the trading hours may be altered by the Board of Governors, its Foreign Currency Options Committee, or an official or officials designated by the Board. Rule 101 of the Board of Governors.

[13] Long calls and short puts constitute one side of the market; short calls and long puts constitute the other side. The position limits for options are equivalent to the following underlying contract values:

British pounds: 3.125 billion
Canadian and Australian dollars: 5 billion
Deutschmarks, Swiss francs, and ECU: 6.25 billion
French francs: 12.5 billion
Japanese yen: 625 billion

The limits for British and German currencies are ten or more times those of the same contracts on the International Stock Exchange. (PHLX may impose stricter limits than 100,000 contracts on uncovered short positions, but such limits do not presently exist.) For ECU futures, the limit is 4,000 contracts during the last five trading days in delivery month.

[14] The CME imposed daily price limits on its currency futures in May 1988. As of November 1988, PBOT has not done likewise.

This change was to make the contracts more attractive to institutional customers.

On PBOT the sizes of the futures contracts are twice those of PHLX options and identical to the competing IMM futures (Exhibit III). The ticks for futures are the same as for options, albeit worth twice as much.

III. Membership of the Exchanges

PHLX

Membership in PHLX is granted to individuals who are affiliated with a broker-dealer partnership or corporation. The employer is then called a "member organization." Sole proprietors and banks are not admitted to membership.[15]

PHLX has one class of active membership, regular, with two levels of privileges: equity (allowing trading of equities only) and options (allowing trading of equities, options on equities, and index options).[16] In 1988, 505 members (the maximum specified by the Certificate of Corporation) came from 290 member organizations. In order to trade foreign currency options, an individual or firm must become a Foreign Currency Options Participant. Participations are also available to non-members; non-member participants have the same privileges as member participants, but do not have to pay the members' annual dues. As of November 1987, some 204 firms--160 member and 44 non-member--were participants.

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[15] The member organization may hold an equity stake in the membership by paying for all or part of its cost under an "A-B-C Agreement." Legal title remains with the individual.

[16] In addition, there is a class of inactive membership, called convertible membership, that can be converted into regular membership. Convertible members cannot vote or exercise any other privileges of membership. As conversions occur, the class is phased out. This class replaced one of the classes in a predecessor exchange association that existed prior to the incorporation of PHLX on July 11, 1972.

There are few specific requirements for membership. Individual members must be at least 21 years old and either have prior experience in the securities industry or complete an orientation program; he/she may also have to pass an examination. Member and foreign currency participant organizations must comply with SEC's net capital rule (Rule 15c3-1), if subject thereto, or have minimum net liquid assets[17] of $25,000 at the time of admission, if exempt from the SEC rule. Thereafter, net liquid assets for registered options traders need only be greater than zero, provided that a letter of guarantee is filed with the exchange by its clearing organization. Specialists, who are exempt from SEC's net capital rule, must maintain higher minimum levels of net liquid assets at all times: $50,000 if they trade only equities, $75,000 if they trade only options, or $100,000 if they trade both equities and options.

PHLX does not regulate the members' clearing activity--that function is performed by the OCC. Many members clear for themselves; five firms are currently active in clearing foreign currency options for others.[18]

Customers of PHLX members are protected against broker failure by the Securities Investor Protection Corporation (SIPC).

PBOT

The form of membership in PBOT is analogous to that in PHLX. Members are individuals, who may register the organization

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[17] Net liquid assets are, approximately, total assets less non-allowable assets and less non-subordinated liabilities, where "non-allowable assets" are those set forth in SEC Rule 15c3-1.

[18] These five are: Bear Stearns & Co., First Options of Chicago (a subsidiary of Continental Illinois National Bank and Trust Co.), Fossett Corporation, Goldberg Securities, and Wagner Stott Clearing Corporation (a subsidiary of Merrill Lynch & Co.).

that employs them. Sole proprietors are admitted (unlike on the PHLX). The member must purchase one share of nonvoting preferred stock. Equity interest in the share can be held by his employer. The share can be leased.

Futures commission merchants and introducing brokers must comply with the financial requirements of Regulations 1.12 and 1.17 of the Commodity Futures Trading Commission (CFTC). Other members must possess net liquid assets of $25,000 at the time of admission and either:

- Be associated with a member who is a registered commodities trader, maintain net liquid assets greater than zero, and file with PBOT a guarantee from its clearing organization or
- Maintain net liquid assets of $15,000 at all times following admission.

Futures commission merchants and introducing brokers must also file with the exchange a copy of the periodic financial reports required by the CFTC. Other members file a copy of their annual financial statements. All members must also file any other financial and operational reports as may be requested by the exchange.

PBOT has approximately 370 members. Only about 30-35 member organizations are actively involved in futures trading, however. (Many of the rest hold shares for investment purposes.)

IV. Trading Procedures

PHLX and PBOT share the same trading floor for currency derivative instruments. Their trading mechanisms are generally similar. The two exchanges differ in that PHLX has market-makers, while individuals permitted to trade for their own accounts on PBOT are not required to make markets.[19]

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[19] This difference has nothing to do with the instruments traded.

PHLX

Trading is conducted by open outcry at posts maintained by specialists and at which registered options traders (ROTs) are present. Specialists are market-makers restricted to executing orders entrusted to them by other members and to maintaining fair and orderly markets. They cannot otherwise trade for any account, including their own or the accounts of their organizations.[20] ROTs may either trade for their own accounts (or the accounts of their member organizations) or broker orders from other members and the public. A third type of participant, floor broker, executes orders for members, member organizations, and (if qualified) the public. Floor brokers, other than ROTs, cannot trade for their own accounts. Further, brokers may not trade unless at least one ROT is present at the trading post.[21] Orders are telephoned to the floor brokers by member organizations or, in some cases, directly by their customers. Members that deal with the public must have management registered with and approved by the exchange as options principals.[22]

Except under extraordinary circumstances, a member may not act both as a ROT and as a floor broker during the same trading session. (If he accepts an order from another party, even if that order is not executed, he has acted as a floor broker.) ROTs, whenever they enter the floor as such and not as brokers, may be called upon by a floor official, a specialist, or any floor broker

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[20] PHLX Rule 1020(c). This restriction applies only to the options in which the specialist is registered. He may trade as a ROT or floor broker in other options or in futures.

[21] PHLX Rule 1063(a).

[22] PHLX Rule 1024(a)(i).

to make a market in their assigned options. A ROT, acting in that capacity, is a specialist for all purposes under the Securities and Exchange Act of 1934.[23] On the foreign currency options floor, all ROTs are assigned to all options.

Both the specialist and the ROT, when acting as such, must engage in dealing "reasonably calculated to contribute to the maintenance of a fair and orderly market."[24] Such engagement need extend only "to a reasonable degree under existing circumstances."[25] The exchange publishes a set of guidelines for the maximum acceptable bid-offer spreads; should the spreads be wider, the market-maker is fined (Exhibit IV). As a practical matter, however, specialists would normally seek to maintain narrower spreads because tight spreads attract investors, increase trading volume, and thereby improve the market-makers' revenues and profits.

A ROT is required to undertake a minimum of in-person trading in his assigned options each quarter, exclusive of orders entrusted to him.[26] Presently, this minimum is the greater of 1,000 contracts or half of all his options trading.[27] The majority of

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[23] PBHX Rule 1014.01.

[24] PBHX Rule 1014(a).

[25] PBHX Rule 1014(c).

[26] PHLX Rules 1014.03 and 1014.14.

[27] The penalty for failing to trade at least 1,000 contracts per quarter is a warning for the first offense, $500 for the second offense, and discretionary by the exchange for third and subsequent offenses.

foreign currency options ROTs trade far more than the minimum: three-quarters of them trade over 5,000 options per quarter.

The market-makers attempt to offset their position risk by participating in the interbank market, trading futures, and hedging with other options (including options on other currencies) --in that order. The specialist, being required to make markets every day, may well face greater potential risk exposure than a ROT, who need not trade as such every day. However, one might expect the specialist's book to give him better insight into the potential direction of the market than is possessed by other players. Hence, specialists might trade profitably over the long term despite being required to go against the market on occasion.[28]

In addition to market-making, the specialist executes market and limit orders entrusted to him by other members.[29] He must execute these orders before trading in his account at the same or better price.[30] As compensation for this service, he receives part of the commission of the broker entrusting him with the order. When trading volume is high, the specialist might obtain substantial revenues from these commissions. When volume is low and the

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[28] This is the case for equities and equity options. It may be less common in the case of foreign currency options.

[29] If he fulfills such orders by using his own account, the member entrusting him with the order can reject the transaction. PHLX Rule 1019.05. The specialist cannot accept any contingency orders other than stop or stop limit orders and cannot accept spread, straddle or combination orders without the approval of a floor official.

[30] PHLX Rule 1019.

market is volatile, he is likely to obtain the greater part of his net revenues from his market-making activities.[31]

Promptly upon the market's openings in the morning and in the evening, the specialist conducts an opening rotation to clear the market of all executable market orders outstanding at that time. The rotation proceeds as follows. The specialist must open all series of options with the nearest expiry month first, then the next nearest expiry month, and so on.[32] He has a choice of opening all calls first, all puts first, or alternating between calls and puts. Beyond that, there are no specific rules guiding the specialist on how to handle imbalances of orders between buys and sells. However, during an opening rotation, the specialist normally should refrain from dealer actions that would reverse the market conditions prevailing at the previous close.[33] No other trading in the specified currency may take place while a rotation is in process. Additional rotations may occur after each halt in trading.[34]

Specialists and floor brokers can be held liable for failing to execute orders when it was possible for them to be executed. However, they must be informed of their error by 12:00 noon on the business day following the trade (including Saturdays for expiring options). ROTs can also be held responsible for any

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[31] This is another characterization that may be more nearly valid for the equity and equity options markets than for foreign currency options.

[32] PHLX Rule 1047.01(a).

[33] PHLX Rule 1020.04.

[34] With the approval of two floor officials, a modified trading rotation may be utilized in case of delayed openings or following trading halts. In a modified rotation, free trading commences once all series in a given expiry month have been opened. PHLX Rule 1047.01(b).

mismatched or unmatched trades if they are informed of their error by 12:00 noon on the following business day.

To guard against conflicts of interest, members and organizations affiliated with specialists may not trade for their own accounts in options in which the specialist is registered.[35] Exemptions to this restriction may be granted, however, under guidelines promulgated by the exchange:[36]

- The specialist organization and the affiliated entity constitute "separate and distinct organizations," maintaining separate books, records and accounts and satisfying separately all applicable financial and capital requirements.[37]
- Chinese walls are established to ensure that material non-public information of the affiliate is not made available to the specialist and that confidential information about the specialist's book is not made available to the affiliate.
- While the two organizations may have common management, no person on either side of the Chinese wall can influence or control the other side.
- Upon request, the specialist may give a broker in the affiliate information that he would give to any other broker; but he may not provide such information on his own initiative.
- If the affiliate intends to clear the specialist's trades, the clearing activities must not compromise the Chinese wall.
- The affiliate may not employ a ROT in the options handled by the specialist.

Should the Chinese wall be breached inadvertently, the specialist should, if so advised by the compliance officer in the affiliate,

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[35] PHLX Rule 1020(e).

[36] Guidelines for Exemption Relief Under Rule 1020 for Approved Persons or Member Organizations Affiliated with a Specialist Member Organization (adopted February 4, 1987).

[37] This restriction does not prevent the organizations from sharing administrative and support resources.

temporarily give up the book and promptly inform the exchange, which will scrutinize the situation for possible violations of law.

Tague Securities Corporation and Drexel Burnham Lambert are the specialists in the most active options at PHLX's day sessions; Salomon Brothers is the sole specialist during the night sessions. One of the specialists, Marine Options Inc., is a subsidiary of a national bank.[38]

Specialists in Foreign Currency Options

	Day Session	Evening Session
Deutsche mark	Tague Securities	Salomon Brothers
Japanese yen	Tague Securities	Salomon Brothers
British pound	Drexel Burnham	Salomon Brothers
Swiss franc	Drexel Burnham	Salomon Brothers
Australian dollar	Cooper, Neff & Associates	Salomon Brothers
Canadian dollar	Canadian Dollar Options and Marine Options	
French franc	Drexel Burnham	
ECU	Cooper, Neff & Associates	

No member or member organization may accumulate positions that are "excessive in view of his financial resources or in view of the market for such security."[39] Their trading is expected to have a "constructive effect" on the market; activities which tend to accelerate price movements are disfavored.[40] To help PHLX

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[38] Two other national banks, Bank of America and Citibank, used to be specialists. The Federal Reserve Board does not permit bank holding companies to own specialist units (decision on the application of Compagnie Financiere de Suez and Banque Indosuez to own a specialist in French franc options, December 9, 1985).

[39] PHLX Rule 1015.

[40] PHLX Rule 1015.01.

enforce these rules, its members must report large open positions to the Office of the Chief Examiner of the Exchange.[41] Any account that accumulates a position of 2,500 or more contracts on the same side of the market must be reported. Any activity by a person, acting alone or in concert with others, that is suspected of attempting to exceed the position limit of 100,000 contracts must be reported. In addition, reports of uncovered short positions must be made when requested by the exchange.

PBOT

Trading is conducted via open outcry at posts on the floor of the exchange. Three types of members are permitted to trade on the floor: floor broker, registered commodities trader (RCT), and board broker. Futures commission merchants and introducing brokers may transmit orders from the public to either floor brokers or RCTs.[42] A floor broker is someone registered as such with the CFTC, but not permitted to trade for his own account or that of his organization.[43] Persons wishing to trade for their own accounts (or the account of their organization) must be registered with PBOT as RCTs. Board brokers are members appointed by the exchange to conduct opening rotations, to execute market or limit orders given them by other members, and to maintain orderli-

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[41] PHLX Rule 1003. This is for options only. There are no analogous reporting requirements for PBOT futures.

[42] In some cases these are the same personnel that act as ROTs and floor brokers in options. Not all PBOT members maintain a floor presence; many trade through other firms.

[43] PBOT Rule 305(a)(4). He or his organization may or may not be subject to the financial requirements of CFTC Regulations 1.12 and 1.17.

ness in the trading crowd. They cannot trade on behalf of the public.[44]

An opening rotation is normally conducted to execute all market orders held by the board broker at the beginning of trading day and any at-the-opening orders held by floor members. Additional rotations are undertaken to re-open trading following each halt or suspension of trading. Orders may be entered, modified, or cancelled during the rotation until the board broker announces the final opening price.[45] After the rotation for the last delivery month is completed, active trading starts.

Due to low levels of interest, no opening rotations are actually being conducted for PBOT currency futures.

The market orders and limit orders held by the board broker constitute his book.[46] Except at the opening rotation, the broker cannot release any information about his book other than the highest bid and lowest offer and the number of contracts at such prices.[47] The exchange is not liable for any error or omission of a board broker.[48]

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[44] PBOT Rule 331. While board brokers perform some of the functions of the options specialists, they are not required to make markets. Board brokers can trade for their own accounts only if also registered as RCTs.

[45] PBOT Rule 316.04(b). RCTS are generally restricted to cancelling or withdrawing orders once the rotation has started. PBOT Rule 316.04(c)(1).

[46] The board broker cannot accept spread orders, straddle orders, or certain types of time orders. Rules 334.01 and 334.02.

[47] PBOT Rules 335 and 336.

[48] PBOT Rule 339.

V. Clearing, Margination and Delivery

This section discusses the exchange's role in clearing contracts, margin requirements imposed on the customers of exchange members, and (summarily) exercise and delivery. Exercise and delivery primarily involve the clearinghouses, rather than the exchanges.[49]

Trade Comparison and Clearing

The trade comparison and clearing systems for PHLX and PBOT are identical inasmuch as the two exchanges operate as one unit and share the same facilities.

Trades are compared on the exchange floor. Immediately after the execution of a trade, the buying and selling members enter the trade information onto multicopy order tickets and compare the tickets.[50] If the tickets do not match, the traders resolve the mismatch on the spot. The seller then takes a copy of each side's ticket and hands them to an employee of the exchange. This clerk re-verifies that the tickets match and, directly on the floor, keypunches the data from each ticket into a computer system called CENTRAMART, based on Honeywell minicomputers.[51] Thus, on normal days the tickets are all matched before they are

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[49] For more information, see An Overview of the Operations of the Options Clearing Corporation (New York, Federal Reserve Bank of New York, 1989). The information in this section is current as of 1988, prior to PHLX's early-morning hours.

[50] The largest participant in a transaction is responsible for time-stamping and matching the order tickets involved. When there is only one seller and one buyer, the seller bears responsibility.

[51] CENTRAMART is also used to process quotation and transaction data for equities. Its capacity has been expanded in the aftermath of the stock market crash in October 1987.

keypunched.[52] Matching "locks in" the trades, making them irrevokable. CENTRAMART, in turn, prints carbon copies of the trade report. A copy is distributed to each clearing member. The traders' clearing members are required to verify that the information given in the CENTRAMART reports is correct and to fill in additional data, such as whether the trade is an opening or closing transaction and the identity of the account in which the transaction is to be placed.[53] The members are also required to confirm the trades with their counterparties, but the CENTRAMART confirmations relieve them of this responsibility.[54] The clearing members must reconcile any unconfirmed trades by a cut-off hour set by the exchange.[55] After this time, the trade reports as reconciled are binding on the clearing members. The matched trade data are then electronically transferred to a mainframe computer, which transmits them to the clearinghouses in Chicago between 4:30 p.m. and 5:00 p.m.[56]

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[52] On heavy trading days, there may not be enough time to reconcile all mismatches before they are entered into CENTRAMART.

[53] Perhaps five percent of the trade records have erroneous or missing data or computer-entry keypunching errors.

[54] PHLX Rule 1054 and PBOT Rule 346. Specialists and board brokers are required to send to the member giving them an order an execution report for the resulting trade. The CENTRAMART reports suffice for this purpose. PHLX Rule 1037.01 and PBOT Rule 340.

[55] PHLX Rule 1054. The precise cut-off time varies from day to day, depending on when the exchange completes its processing. After giving the members the trade summaries, PHLX usually gives them half a hour to reconciliate unmatched trades. (The cut-off time in practice is approximately 4:00 p.m. at the latest.)

[56] All times are Eastern.

The clearinghouses, Options Clearing Corporation (OCC) and its subsidiary, Intermarket Clearing Corporation (ICC), have developed a clearing scheme for foreign currency options that accommodates extended trading hours on domestic exchanges and also trading in foreign time zones. In this system, known as the International Clearing System (ICS), the processing work is compressed into a few hours in the late afternoon, so that reports of positions, exercises, and assignments of exercises may be generated at approximately 6:30 p.m. Eastern time, but definitely before 7:00 p.m. (This is up to one hour after the start of the evening trading session in the winter; any trader that believes he has closed out a short position at the market's opening may nonetheless be assigned a delivery notice.) A margination report is not prepared until later; it is issued by 8:00 a.m. the following morning, along with additional exercise/assignment, settlement, and other non-equity options data. Payment of margins is due at 10:00 a.m. that morning, well after trading has started for the day.[57]

Options are officially "issued" by the OCC at 1:00 p.m. on the day following the trade (or at the close of trading on the last trading day).

The failure of the purchasing clearing member to pay the options premium by the 10:00 a.m. deadline specified by OCC gives the writer the right either to cancel the transaction or to enter into a new transaction and to charge the loss, if any, to the defaulting member.[58] (Such defaults are not covered by the clearinghouse's guarantee, since it rejects such transactions.)

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[57] In truth, the trading "day" actually began at 6:00 p.m. EST/7:00 p.m. EDT the previous evening.

[58] PHLX Rule 1040.

Should any trades remain uncompared after the cut-off hour on the day of the trade, clearing members have until 8:30 a.m. on the next day to resolve them.[59] If they fail to meet this deadline, the trades shall be closed out promptly, but not later than 2:00 p.m. that day.[60] If either party to the transaction made the trade on behalf of a customer, then the close-out is effected by that member's entering a new trade to re-establish the position. The customer does not lose; the member initially absorbs the loss, if any, and may file a claim for damages. If the member is acting for his own account, however, he has a choice of whether or not to re-establish his position. If he does not, damages are based on the counterparty's newly established position.

Margination for Customers

PHLX sets minimum margin requirements applicable to the customers of its members. These requirements are shaped in part by the Federal Reserve Board's Regulation T. They are different, however, from the margin requirements set by OCC for its clearing members.[61]

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[59] PHLX Rule 1039.

[60] Ibid.

[61] OCC's margin requirements for currency options (included in its systems for non-equity options) are complex. OCC attempts to protect itself against the cost of liquidating a clearing member's portfolio in the event of an assumed worst-case change in the prices of the underlying assets. In simplest terms, this means that OCC sets margin equal to the highest amount premiums would be 95 percent of the time as the prices of the underlying fluctuate, using either 3-month or 1-year price history. This margin is announced as the sum of two parts --the premium and an "additional" amount (representing the rest). In practice, whole portfolios --not just separate classes of options--are considered, so that correlations between certain currencies (specifically, the deutschmark, Swiss franc, French franc, and ECU) are taken into account. This system applies specifically to accounts maintained for market professionals (firm, market-maker, and registered trader accounts). Segregated customer accounts are handled in a modified fashion inasmuch as OCC does not have a lien on most long positions in such accounts.

For uncovered short positions, the margin requirement is the marked-to-market amount of the option premium plus 4 percent of the current market value of the underlying contract, reduced by the out-of-the-money element, if any, subject to a minimum of the option premium plus 0.75 percent of the market value of the contract.[62] The current market value of the contract is the contract amount multiplied by the average of the spot exchange rates quoted by a group of New York City commercial banks at about 2:30 p.m. each business day. (The seller may deposit the premium due him from the buyer as partial payment for his margin liabilities.)

Spreads and straddles have lower margin requirements if the long position expires on or after the short position.[63] In all cases, the premium on the long position must be paid in full.

Bull call spreads/bear put spreads: Whenever the exercise price of the long call (or short put) is less than the exercise price of the short call (or long put), there is no margin on the short position.

Bear call spreads/bull put spreads: Whenever the exercise price of the long call (or short put) is greater than the exercise price of the short call (or long put), the margin on the short position is limited to the difference between the two exercise prices.

Straddles: The margin is that required for an uncovered short call or short put, whichever is greater, plus the in-the-money amount (unrealized loss) on the other short.

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[62] PHLX may require additional margin for short options with a long time to expiration or where the underlying is unusually volatile or illiquid. (PHLX Rule 722) PHLX has never actually required such additional margin for its currency options contracts.

[63] Spreads are combinations of long and short calls or long and short puts. Straddles are combinations of short positions (calls and puts) or long positions (calls and puts).

No margin is required for short positions that are covered by the appropriate currency: foreign currencies (in the case of short calls) or U.S. dollars (in the case of short puts). This cover may be provided by delivery of either the appropriate currency to the exchange broker[64] or a letter of guarantee issued by a PHLX- or OCC-approved custodian, certifying that the custodian holds the amount of underlying currency (or equivalents, in the case of U.S. dollars) and has assigned such to OCC. Forward and futures transactions are not recognized as hedges for short options contracts.

PHLX requires that customers pay premiums and post margin within seven full business days from the date of the trade, unless extended by the exchange upon application by the customer. In contrast, OCC requires clearing members to post margin with it by 10:00 a.m. on the business day following the trade. As a practical matter, no clearing member would want to be exposed to its customers for more than one day, let alone for six business days. We understand that retail customers are usually required to have the margin cover (or borrowing power) in their accounts before a broker will execute a trade for them. Institutional customers could be required to post margin the day after the trade, with the precise time subject to negotiation. Should the customer fail to post margin that day, the broker would decide on a case-by-case basis whether to liquidate the position or to carry it longer.[65]

Customer margin obligations may be met by deposit of cash, any kind of securities, or a letter of credit from a bank approved by PHLX. PHLX has published criteria, including capital

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[64] U.S. government and agency securities, negotiable bank certificates of deposit, and bankers acceptances may be substituted for U.S. dollars.

[65] Futures positions cannot be carried past 2:00 p.m. on the second business day following the trade, under CFTC regulations.

and surplus of at least $200 million, to be met by any institution that seeks approval to issue these letters.[66] As of year-end 1988, nine banks were so approved (Exhibit V).

The initial margin must be maintained with the clearing firms every day, calculated anew using each day's closing premium and spot currency foreign exchange rate. For options there is no variation margin as such, although the difference between the current day's margin requirement and the previous day's requirement may loosely be considered the equivalent of variation margin.[67]

For customers in futures, a flat initial margin is required on each contract. (See Exhibit III for margin levels.) In addition, if the futures price moves up, variation margin is called at the end of each day. If the futures price declines, variation margin credit may be given. However, variation credit is not allowed if it would bring total margin (initial plus variation) less than specified maintenance levels, as this is the amount of margin which the clearing member would deposit with the clearinghouse. Cross-margining with options is not allowed.

Exercise and Delivery

Approximately 25-30 percent of PHLX currency options are exercised at expiration, while another five percent are exercised early.[68] Exercise and settlement of options are accomplished

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[66] Commentary to PHLX Rule 722. Additionally, no institution may issue to any one customer a letter of credit for more than 15 percent of its capital or to all customers letters for more than 20 percent of its capital.

[67] We say "loosely" because even though the premium and the value of the contract are both marked-to-market daily, the full increment in the mark-to-market value of the contract (a true "variation margin") is not called.

[68] Paul J. Adair, Philadelphia Stock Exchange.

through OCC using its International Clearing System, while delivery on futures contracts is handled by ICC.

American-style options may be exercised at the option of the holder on any day prior to the last trading day and also on expiry Saturday. Prior to last trading day, exercise requests outstanding at 3:30 p.m. on the day of the tender are accepted by OCC for settlement on the fourth following business day; they are irrevocable at that point. (Exercise notices received after 3:30 p.m. become part of the following day's exercises.) Exercise requests are not accepted on the last trading day. Instead, by 8:00 a.m. the following day (expiration Saturday) OCC will issue an exercise form which is to be completed and returned by 10:00 a.m., showing the options for which exercise is desired. By 3:00 p.m., OCC issues another form reflecting the morning's responses; members have until 5:00 p.m. to make changes thereon.[69] The 5:00 p.m. cutoff is designed to allow adequate time after the last day's trading for clearing and resolution of unmatched trades from that day.[70]

When the options are exercised on expiry Saturday, delivery is on the third Wednesday of the month.[71]

OCC randomly assigns exercise notices to clearing members. The member firms, in turn, may assign the options to customers either on a random basis or on a "first-in, first-out"

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[69] The exercise privilege officially expires at 11:59 p.m. on expiry Saturday.

[70] In particular, exchange members have up to 12 noon on expiration Saturday to request a report on a trade executed by a specialist. If the specialist does not respond, he is responsible for any loss on the trade. PHLX Rule 1037.

[71] The Saturday and Sunday of the weekend of expiry are business days to OCC. Thus, when exercise is made on expiry Saturday, delivery occurs four business days later, just as it does for any other exercise date.

basis.[72] The firms must require their customers to arrange for delivery of the foreign currency (in the case of calls) or payment of the exercise price (in the case of puts) within the timetable set by OCC for its members.[73]

The delivery procedures for PHLX options and PBOT futures are essentially the same. Currencies due to be delivered under options contracts are netted and involve OCC. Those to be delivered under futures contracts are likewise netted and involve ICC. Clearing firms that are members of both OCC and ICC may choose to net their obligations to the two clearinghouses, picking one or the other as counterparty for the net amount.

Clearing members have a choice of two general procedures for delivery of foreign currency and U.S. dollars. The "regular way" to transfer dollars to the clearinghouses is for the clearinghouse to debit a member firm's account at a designated clearing bank two days before settlement.[74] Also, the members must cause an approved depository to issue on the day before settlement day a guarantee that the foreign currency will be paid to a settlement bank in the currency's home country the next day.[75] Such approved depositories may include the settlement bank itself,

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[72] PHLX Rule 1043(a).

[73] PHLX Rule 1044.

[74] The clearinghouses invest these funds in the overnight repo market for the benefit of the member.

[75] Such guarantees constitute a contractual step in the settlement process. If the clearinghouse does not receive a guarantee within the established timeframe, it borrows the settlement amount of foreign currency and charges the costs of borrowing to the clearing member involved.

another bank whose correspondent is the settlement bank, or one of the clearinghouse's own agent banks.

Alternately, a clearing member may elect the "delivery versus payment" method. Under the method, the clearing member's bank guarantees to pay the clearinghouse's correspondent bank on settlement day. Such a guarantee must be received two days prior to settlement.

VI. Governing Bodies

PHLX

The Certificate of Incorporation of PHLX invests management authority in a Board of Governors ("Board"). The Board has wide powers, including the rights to punish members, to remove individual governors from office, and to amend the By-Laws (save for specific sections where a vote of the membership is required). The Rules of the Board, together with the By-Laws, regulate the daily operations of the exchange. The Board has one regular meeting each year, immediately after the annual meeting of the membership; special meetings can be called by the chairman or the president or upon written request of thirteen governors.[76]

The Board is constituted of at least 28 members, including its chairman, two vice-chairmen, a president, and 24 other governors.[77] The chairman is elected for a two-year term, the vice-chairman for one year, and the other governors for three years. One of the vice-chairmen and at least nine of the other governors must come from firms whose principal business involves

---

[76] Under the By-Laws, Section 4-4(b)(xix), the Board has the power to appoint an executive committee, consisting of two or more members, to exercise its powers in managing the exchange.

[77] The maximum number of other governors is 26. In addition, the immediate past chairman is an ex-officio member of the Board for one year after leaving office; and the past president, who retired in 1981, serves as a voting member at the pleasure of the Board.

trading on the floor of the exchange. The other vice-chairman and at least nine of the other governors must come from broker-dealers whose primary focus is on dealing with the public. Three governors are elected at-large. Three governors are appointed by the Board to represent the public; they may not be affiliated with any broker-dealer.

The Board has 13 standing committees. All consist of nine members, appointed to serve for terms of one year. Seven of these committees are in some way involved with foreign currency options, as indicated:

> The Admissions Committee reviews and approves applications for membership and foreign currency participations.
>
> The Allocation, Evaluation and Securities Committee has jurisdiction over trading privileges for both equities and options. It appoints specialists and other types of market-makers and evaluates their performance.
>
> The Arbitration Committee arbitrates disputes between members and between members and their customers.
>
> The Business Conduct Committee monitors compliance with the Securities Exchange Act and the rules of PHLX (including their financial standards), conducts disciplinary hearings, and imposes penalties (including expulsion of a member) for violations. This committee also recommends margin requirements for the members' customers. It does not, however, have jurisdiction over floor operations.[78]
>
> The Disciplinary Review Committee reviews the decisions, whether appealed or not, of the Business Conduct Committee.
>
> The Executive Committee implements corporate policy established by the Board and makes recommendations regarding same.[79]

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[78] The Business Conduct Committee is assisted by two departments of PHLX: the Examination Department, responsible for monitoring the members' financial condition, and the Surveillance Department, which monitors compliance with trading rules.

[79] This powerful committee consists of at least nine members: the chairman, two vice-chairmen, the immediate past chairman, the president, at least three other governors, and the executive vice president of the exchange. It does not need to meet in order to act. By-Laws, Section 10-12.

The Foreign Currency Options Committee has general supervisory authority for trading of foreign currency options. It makes and enforces rules and regulations relating to order on the trading floor and can impose penalties for violations thereof. It resolves trading disputes. The committee has supervisory responsibility for specialists and other market-makers and provides information and advice about these members to the Allocation, Evaluation and Securities Committees.

The president is the principal executive officer of PHLX. With the approval of the Board, he appoints other officers. In emergencies, the president can close the exchange and can fix its operating hours.[80] He serves at the pleasure of the Board. The current president is Mr. Nicholas A. Giordano.[81]

PBOT

PBOT is tightly controlled by its parent. It is governed by a board of 18 directors, six of whom are ex-officio: five members from the Board of PHLX and the president of PBOT. The chairman of PBOT is the chairman of PHLX and the vice-chairman is the president of PHLX. Of the other 12 members of the board, seven (five representing member firms and two representing the public) are nominated by a committee consisting of the ex-officio members and two other individuals appointed by the chairman. Five directors are nominated by petition from the membership. The members of PBOT have no voting rights. Mr. Arnold Staloff has served as president of PBOT since its founding.

The Board of Directors has seven standing committees: Admissions, Business Conduct, Commodity Floor Procedure, Executive, Finance, Margin and Nominating. The Finance Committee is the same

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[80] By-Laws, Section 4-4(b)(i).

[81] Mr. Giordano is also Chairman of the Boards of Directors of several PHLX affiliates: Stock Clearing Corporation of Philadelphia, Philadelphia Depository Trust Company, and Financial Automation Corporation of Philadelphia.

as that for PHLX. The margin committee, consisting of at least three individuals, has the power to set and alter levels of margin for each futures or option contract traded. The other committees function similarly to their PHLX counterparts.

Among other things, the Board is empowered to take action in an emergency. "Emergency" is defined rather broadly and includes not only physical emergencies, but also any manipulative activity, any action taken by a governmental body or other exchange, the bankruptcy of any member organization, and "any other unusual, unforeseeable and adverse circumstance."[82] In such a situation, the Board may suspend trading, change the hours of trading, limit trading to liquidation only, change the expiration date in contracts, order the liquidation of contracts, and modify or suspend any provision of the by-laws and rules of both the exchange and its clearing agency.[83] Such action can be taken with the affirmative vote of as few as four directors, provided that they constitute a two-thirds majority of a meeting at which at least six directors are physically present.

---

[82] Rule 15 of PBOT.

[83] Rule 60 of PBOT.

Exhibit I

Volume of Trading
(Number of Contracts)

Contract Options-PHLX	Date Introduced	1988[1]	1987	1986
Deutsche mark	2/ 4/83	3,327,661	4,300,894	2,525,721
Japanese yen	1/14/83	2,932,950	2,465,795	1,898,510
British pound	12/10/82	1,301,377	1,898,962	986,105
Swiss franc	1/26/83	1,296,882	1,296,290	2,363,641
Australian dollar	1/19/87	473,541	227,460	---
Canadian dollar	2/11/83	328,554	198,362	172,726
French franc	9/17/84	251,880	84,566	45,275
European currency unit	2/12/86	1,227	2,343	12,729
Total		9,914,072	10,474,672	8,004,707
Futures-PBOT				
Deutsche mark	8/ 8/86	1,268	5,041	9,023
British pound	8/ 8/86	82	3,462	225
Swiss franc	8/ 8/86	30	2,231	639
Canadian dollar	8/ 8/86	-0-	162	-0-
Japanese yen	8/ 8/8	5	60	6,384
Australian dollar	3/22/88	-0-	37	-0-
French franc	8/ 8/86	-0-	-0-	-0-
European currency unit	8/ 8/86	-0-	-0-	-0-
Total		1,385	10,993	16,271

Source: Philadelphia Stock Exchange

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[1] Estimate based on preliminary data.

Exhibit II

Currency Options on PHLX[1]

Option	Units	Exercise Price Intervals	Price Quotation	Minimum Price Movement ¢/Unit	Value
Australian dollar	A$50,000	1¢	Cents per unit	.01	$5.00
British pound	£31,250	2.5¢	Cents per unit	.01	$3.125
Canadian dollar	C$50,000	.5¢	Cents per unit	.01	$5.00
Deutsche mark	DM62,500	1¢	Cents per unit	.01	$6.25
French franc	FF125,000	.25¢	Tenths of a cent per unit	.(0)05	$6.25
Japanese yen	¥6,250,000	.01¢	Hundredths of a cent per unit	.(00)01	$6.25
Swiss franc	SF62,500	1¢	Cents per unit	.01	$6.25
European currency unit	ECU62,500	2¢	Cents per unit	.01	$6.25

[1] All options have the following features in common:

Trading hours:	4:30 a.m. - 2:30 p.m., Monday thru Friday (all currencies) 6:00 p.m. - 10:00 p.m. EST or 7:00 p.m. - 11:00 p.m. EDT, Sunday thru Thursday (Australian, British, German, Japanese, and Swiss currencies)
Expiry months:	March, June, September, December plus 2 additional near-term months
Expiry day:	Saturday before third Wednesday of expiry month
Last trading day:	Friday before third Wednesday of expiry month
Margin for uncovered writer:	Option premium plus 4 percent of underlying contract value less out-of-the-money amount, if any, with a minimum of option premium plus 0.75 percent of underlying contract value.
Position and exercise limits:	100,000 contracts

Exhibit III

Futures on PBOT[1]

Options	Underlying Units	Price Quotation	Minimum Price Movement ¢/Unit	Minimum Price Movement Value	Margin Initial	Margin Maintenance
ustralian dollar	A$100,000	Cents per unit	.01	$10.00	$1,200	$ 900
ritish pound	£62,500	Cents per unit	.01	$ 6.25	1,200	900
anadian dollar	C$100,000	Cents per unit	.01	$10.00	900	700
eutsche mark	DM125,000	Cents per unit	.01	$12.50	2,000	1,500
rench franc	FF250,000	Tenths of a cent per unit	.(0)05	$12.50	1,200	900
apanese yen	¥12,500,000	Hundredths of a cent per unit	.(00)01	$12.50	2,000	1,500
wiss franc	SF125,000	Cents per unit	.01	$12.50	2,400	1,800
uropean currency unit	ECU125,000	Cents per unit	.01	$12.50	3,600	2,700

All futures have the following features in common:

Trading hours: 4:30 a.m. - 2:30 p.m., Monday thru Friday (all currencies)
6:00 p.m. - 10:00 p.m. EST or
7:00 p.m. - 11:00 p.m. EDT, Sunday thru Thursday (Australian, British, German, Japanese, and Swiss currencies)

Delivery months: March, June, September, December plus 2 additional near-term months

Delivery day: Third Wednesday of delivery month

ast trading day: Friday before third Wednesday of delivery month

Position limits: 6,000 contracts (4,000 contracts for ECU during the last five trading days in delivery month)

Exhibit IV

Maximum Bid-Offer Spreads
Characterizing a Fair and Orderly Market

Contract	Tick size	Maximum Disparity
German mark Swiss franc Australian dollar ECU[1]	.01¢	.04¢ when the bid is not over .40¢ .08¢ when the bid is over .40¢ but not over 1.60¢ .12¢ when the bid is over 1.60¢
Japanese yen	.0001¢	.0004¢ when the bid is not over .0040¢ .0008¢ when the bid is over .0040¢ but not over .0160¢ .0012¢ when the bid is over .0160¢
British pound	.01¢	20¢ when the bid is not over $2.00 40¢ when the bid is over $2.00 but not over $8.00 60¢ when the bid is over $8.00
French franc	.005¢	20¢ when the bid is not over $2.00 40¢ when the bid is over $2.00 but not over $8.00 60¢ when the bid is over $8.00
Canadian dollar	.01¢	.05¢ when the bid is not over .50¢ .10¢ when the bid is over .50¢ but not over 2.00¢ .15¢ when the bid is over 2.00¢

Source: Option Floor Procedure Advice F-6.

---

[1] For the two longest term series of ECU, the maximum bid-ask differentials are twice those shown here.

Exhibit V

Banks Approved to Issue Letters of Credit

Amro Bank
New York, N.Y.

Bank of America
Chicago, Ill., San Francisco, Calif.,
and London, England

Barclays Bank Plc
New York, N.Y.

Credit Lyonnais
New York, N.Y.

Fidelity Bank, N.A.
Philadelphia, Penn. and London, England

Philadelphia National Bank
Philadelphia, Penn. and London, England

Pittsburgh National Bank
Pittsburgh, Penn.

Provident National Bank
Philadelphia, Penn.

Westpac Banking Corp.
New York. N.Y.

The International Money Markets In London and First Chicago's Role In Clearing and Settling For Dollar Instruments

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APPENDIX: Requirements for London Good Delivery

Part I

INTRODUCTION TO THE INTERNATIONAL MONEY MARKETS IN LONDON

The clearing and settling of U.S. dollar-denominated money market instruments in London is in the midst of significant change. Back-office support for London dollar certificate of deposits, which are held and traded in definitive form, is coming to be provided primarily by one institution, First Chicago, while Euro-commercial paper is increasingly being held and traded through Euro-clear and Cedel in book-entry form. Although London dollar CDs still trade in physical form, the concentration of business in one institution is one step closer to a book-entry system. This centralization of business also allows greater efficiency in clearing and settlements. Meanwhile, the Bank of England has started to develop a book-entry transfer system for sterling money market instruments, which have, until now, been traded in physical form. The implementation of the Bank of England's system could well have implications for the clearing and settlement of non-sterling money markets instruments in London in the future.

In general, the international money markets in London are moving towards more centralized clearing and settlement, with a different risk profile than existed previously. To some extent this movement reflects a typical process. Initially, a market springs up informally as a new product

catches on using whatever front-office technology is available. The after-trade processing is at first loaded on to the participating institutions' existing back office systems. Time passes. Volume increases. Some institutions see the clearing and settling business as potentially profitable and start competing for the business. In time, a few institutions specialize their operations to support the market. Sometimes, as in the case of London dollar CDs, one institution captures the bulk of the business, opening the way to significant increases in efficiency through scale economies.

Clearing and settling for Euro-commercial paper (ECP) and for Euro-certificates of deposit (ECD or London CDs) has evolved in very different ways. This reflects both differences between the markets and instruments and the vagaries of competition for the clearing and settling business. In the first part of this paper, some of the major differences between ECP and London CD market are described. How these differences influence the way in which clearing and settlement of the different instruments are managed will be considered in the second part of the paper.

Traditionally, short term instruments in London have traded in definitive form. Guidelines by the British Bankers' Association for "good delivery" in London require delivery of physical securities. In addition, the tax treatment favors physical securities. A stamp tax applies to all book-entry transfers but not to bearer securities. Participants have been able to avoid the tax in the case of Euro-commercial paper, however, because of the role played by Euro-clear and Cedel. Both Euro-clear and Cedel are located outside the United Kingdom so that even though a single security (global note) may be held physically in London, it is held in the name of Euro-clear or Cedel so that transfers on their book-entry system among different parties are not taxable in London. For this to occur the note must be in one common depository. Euro-clear and Cedel currently use two common depositories in London, Chase (Cedel) and Morgan Guaranty (Euro-clear). First Chicago, which handles the bulk of the clearing and

settlement and a large part of the custody of London CDs, has not been able to take advantage of this arrangement because, at least until recently, it has not been a common depository for Euro-clear and Cedel.

In the last three years, Euro-commercial paper programs have accounted for a larger share of new international borrowing facilities, as seen in the following table. ECP programs are generally considered to be a subsector of the Euronote market. A Euronote program is a medium term arrangement enabling a borrower to issue short-term paper in its own name. The earliest versions were Note Issuance Facilities (NIFS) and other "committed" programs. Under these arrangements, a group of underwriting banks guarantee the availability of funds to the borrower by purchasing any unsold notes at each roll-over date or by providing a stand-by credit.

Table 1

INTERNATIONAL BORROWING FACILITIES*

(billions of dollars)

	1985	1986	1987	1988
Note issuance facilities**	34.4	24.8	29.0	13.2
Other committed facilities	8.5	4.5	2.2	2.3
Euro-commercial paper programs	12.6	59.0	55.8	57.3
Other non-underwritten facilities	10.6	8.6	15.2	19.5
of which: MTN programs	-	(1.7)	(8.0)	(12.4)
Total	66.1	96.9	102.2	92.3

* Source: OECD Financial Market Trends, February 1989 Excludes merger-related standbys. Shows programs arranged.

** Including multiple-component facilities.

In contrast, ECP is not underwritten. An agent sets up a program or facility for the borrower. When the borrower feels that he can get an attractive rate in the market, he informs the agent of the amount and the desired terms. The agent then distributes the paper on a best efforts basis. This distribution is quicker and easier than issuing through a tender panel and fees are less for ECP than for NIFS. ECP also has lower start-up costs. The proportion of programs with associated bank lines has been growing as more programs have become rated. Finally, capital requirements for underwriting commitments have dampened banks' interest in underwritten facilities.[1] Issuance of notes under Euro-commercial paper programs has been growing even more rapidly than the programs themselves. As seen in Table 2, issuance soared by 67 percent in the first nine months of 1988.

Euro-certificates of deposit, which are not included in international borrowing facilities, are a more mature market, showing little growth in recent years. The secondary market for London CDs is much more active, however, running at about $5 billion per day according to market sources. ECP, in contrast, had only $900 million per day turnover in the first three quarters of 1988, versus $1.5 billion gross per day of primary market activity.[2]

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[1] There is no difference between the various types of Euronotes from the point of view of clearing and settling and safekeeping.

[2] These figures are from Euro-clear and Cedel and include notes issued under committed Euronote programs as well as ECP. The actual turnover figures for ECP are probably even smaller.

Table 2

Outstandings Euro-commercial Paper and Euro-certificates of Deposits*

(billions of dollars)

	1986** March	1986	1987	1988
Euro-commercial paper and other non-underwritten facilities	4.5	13.9	33.3	53.3
Underwritten Facilities	14.9	15.1	16.9	13.5
Medium Term Notes	-	.4	2.6	5.7
Total of Above	19.4	29.4	52.8	72.6
Non-Sterling CDs and Other Short term Paper Issued in London	92.1	114.1	133.4	126.0***

* Sources, Bank of England Quarterly Bulletin, Euro-clear, OECD Financial Markets Trends.

** Early estimates of outstandings under Euronote programs. The CD figure is for the end of 1985.

*** September 1988.

Euro-commercial Paper

Euro-commercial paper is issued in London in the form of unsecured short-term promissory notes under medium-term arrangements between dealers and issuers. Although ECP is similar to London CDs, particularly those CDs issued under a program, it is worthwhile considering some features peculiar to each market. Both ECP and ECD are short-term instruments, although London-issued CDs can have maturities of up to 5 years.[3] In practice, however, the maturities of ECP are more varied as issues are tailored to meet the needs of the issuer and investor more than

[3] In theory, ECP can have any maturity, but in practice it is usually less than one year. Medium Term Notes (MTN) are handled like Eurobonds, usually with a global note and a 90 day lock-up. Maturities are generally 3 to 5 years. FCCC acts as depository for MTN, but does not have a specialized role in their settlement as it does for ECD and ECP.

in the case of standard Euronotes or London CDs. On balance, the maturity of ECP ranges between 60-90 days, in contrast to 15 to 30 days for the United States CP market. The investor base for ECP is wide and growing. Investors usually follow a buy and hold strategy. The notes may be in any non-sterling currency subject to the approval of the appropriate national authorities.[4] Most of the programs are in dollars, but there has been a growing trend recently towards issuing in dollars and then transforming the resulting asset or liability using foreign exchanges swaps to take advantage of interest rate windows.

Both ECP and London CDs typically have a two-day settlement period. A trade executed on Monday is settled Wednesday, when both securities and payment are typically exchanged. The two days ("spot") for London CDs reflects the standard for settlement in Euro-deposits and the foreign exchange markets. (The time from instructions to final cash movement is same-day for FCCC and next day for Euro-clear.)

Corporations, sovereigns and state agencies from industrial countries are the largest issuers of Euro-notes. Borrowers (firms and government agencies) from the United States, Australia, the United Kingdom and Sweden were the largest issuers under all Euro-note programs at the end of June 1988, accounting for over half of the total. (See Table 3.) Borrowers from these four countries accounted for nearly 55 percent ($28 billion) of ECP issues in mid-1988. Strong investor demand for sovereign ECP since October of 1987 has led to very competitive rates on sovereign paper and sizable issuance by Belgium, Sweden and Denmark, among others. Investors in ECP in 1988 have tended to demand less of a premium for lower-rated ECP than would be the case in the U.S. domestic market,

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[4] Some central banks have not given such approval. Thus, there is no mark-denominated ECP, but there is an active domestic sterling CP market.

Table 3

EURO-COMMERCIAL PAPER PROGRAMS*

(billions of dollars) By Issuer Country

	1985	1986	1987	1988
OECD	12.5	58.3	54.0	56.3
Australia	2.4	5.6	4.3	4.2
Canada	0.1	1.6	1.6	2.0
Denmark	0.2	1.7	1.3	2.1
Finland	0.7	0.9	1.8	2.9
France	0.3	3.7	1.2	1.4
Germany	-	2.0	0.5	0.6
Italy	0.5	3.8	2.7	2.0
Japan	0.1	11.5	8.4	6.6
New Zealand	-	1.0	2.4	1.6
Norway	1.4	2.4	3.2	1.5
Sweden	2.0	3.9	2.6	8.7
United Kingdom	0.7	2.2	8.0	7.6
United States	3.3	14.4	10.4	6.8
Other OECD	0.8	3.6	5.6	8.3
Non-OECD	0.1	0.7	1.8	1.0
Total	12.6	59.0	55.8	57.3

*Source: OECD: Financial Market Trends, February 1989

and some lower-rated U.S. corporations have been able to obtain relatively cheap funds through ECP. In 1988, higher rated U.S. corporations, however, were able to raise cheaper funds in the U.S. CP market.

The investor base in Euro-commercial paper is much broader and more diverse than in the U.S. commercial paper market. Although there are no publicly available statistics on the composition of the ECP investor base, it is internationally diversified, with the largest pools of investors in Japan, Europe and North America. According to some market participants, corporate investment in ECP picked up in 1988 as well as

institutional and specialized money fund investment. Government investors, particularly central banks, have played a significant role in the ECP market. These investors tend to focus on sovereign paper and have driven the rates on sovereign ECP well below Libid. Japanese investors already are taking up a fair amount of ECP even though they are apparently somewhat limited by official guidelines.[5] Most market participants expect Japanese securities firms and banks to break into the ECP league tables by dipping into the deep pockets of Japanese investors.

The dealers of Euro-CP and Euro-CD programs are dominated by U.S. commercial and investment banks and by Swiss banks. S.G. Warburg also ranks high in the league table, tending to specialize in bank programs. The market is very competitive. Few firms are thought to be making much money from distributing ECP. To a large extent, firms justify their presence in the market in terms of maintaining relationships with their clients, keeping in daily touch with clients, on both the investment and borrowing sides. Altogether, there may be 60 to 70 firms that consider themselves ECP dealers, but many of these are quite specialized and, according to one estimate, the top 10 dealers account for 80 to 85 percent of the market. This would probably be more concentrated than a year ago, but less concentrated than in the U.S. CP market.

Typically, the dealer arranging an ECP program undertakes to make a market in the issue. Active competition means that successful agents try to accommodate investors that want to sell, whenever this is not too expensive. This provides some liquidity to the market. Some dealers

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[5] These guidelines limit them to rated paper, at least A-2/P-2, with a return of Libid or better. Moodys and Standard & Poors have three ratings for short-term paper. A-3 and P-3 cannot be sold easily. A-2 and P-2 are the ratings where the capacity for timely payments is strong, but not as high as for A-1 or P-1. Libid refers to the London interbank bid rate.

do quote to other dealers, but many focus primarily on their own investor base. Bid/ask spreads tend to be between 3 and 5 basis points, while the units transacted range from $2 million to $7 million.

Maturities in the ECP market reflect investors' preferences and are generally longer than the 30 days in the U.S. domestic CP market. Average maturities of drawings on ECP programs tend to be closer to 2 or 3 months. This can vary depending on the investor base and the interest rate environment. For example, evidence suggests a significant reduction in maturities in the summer of 1988, for some investors, as interest rates were rising. Pricing on ECP also varies and in late 1988 it ranged between Libid minus 25 basis points for AAA sovereigns and Libor plus 25 basis points for BBB borrowers, with the median falling between Libid and Libor. Generally, borrowers can get relatively better rates in the ECP market in the longer maturities, while rates are cheaper in the U.S. market at shorter maturities.

Interest rates on ECP tend to move in line with interbank rates, such as Libor or Libid. This appears to reflect changes in rates in alternative markets that investors are considering. Bank deposits, the interbank market, London CDs, and to a limited extent, domestic money market instruments are the investment instruments competing with ECP. Thus, even though most participants believe that bank investors have been purchasing a relatively smaller share of ECP than earlier in the history of the market, interest rates on ECP tend to move with interbank rates. Sovereign ECP is, however, an exception as rates on such paper can deviate significantly from interbank rates, as central banks bid strongly for the paper.

The bulk of Euro-CP is issued in dollars. Figures on non-dollar Euro-CP and Euronotes from Euro-clear and Cedel are one-tenth the size of those for dollar-denominated paper. These statistics refer only to original issue. A significant and growing share of dollar ECP is transformed into

other currencies through the forward exchange market or the swap market. A number of European investors have started to compare rates they can get on synthetic ECP with those available on the domestic money markets. A German investor, for example, could buy dollar ECP and then cover himself in the forward market. Neither Euro-clear nor Cedel would be aware of the foreign exchange transaction, and the issuance would be reflected in their reports as dollars. Borrowers may also issue in dollars and then swap into other currencies, for example, to meet the needs of their subsidiaries in different countries. One market participant guessed that in all, synthetic ECP could make up 10 to 20 percent of the dollar market.

One of the major trends in the ECP market, spurred by the October 19 crash, is towards rated paper. Investors are putting more emphasis on ratings, as by Standard & Poors and Moodys. In some cases unrated paper by well-known borrowers has experienced noticeable price deterioration. As more institutional investors enter the market and they are given blanket approval to purchase paper rated above a certain level, ratings will become more important. Dealers observe that already it is becoming easier to place rated paper. One participant estimates that over 50 percent of all programs currently are directly or indirectly rated as compared with 30 percent a year ago. Quite often institutional investors will have a list of eligible issuers determined in part by the "name" and familiarity. For example, a Finnish investor could have several unrated Finnish corporations on his list and a minimum credit rating. Dealers and issuers will be able to expand their investor pools through ratings.

New regulations also encourage the shift towards rated paper. The Securities Association (TSA), which oversees firms primarily engaged in securities business, has set capital ratios for these firms.[6] For securities that "qualify", firms do not have to hold as much capital. To qualify, either the paper must be rated, above a minimum level which is quite low, or it must fall into certain categories. Examples of such categories are securities issued by OECD governments or by state companies 75 percent or more government-owned, as well as paper issued by authorized banks, or by U.K. companies whose shares are listed as alpha or beta stocks on the International Stock Exchange. The new regulations, which became effective in April of 1988, may be discouraging securities firms from holding inventories of unrated paper, and discouraging unrated borrowers.

The shift towards rated instruments is also encouraging various forms of credit enhancements, such as letters of credit and asset-backed commercial paper programs. These improve the ECP rating. The first Euro-CP program backed by mortgages was launched in 1988. Asset-backed ECP, however, remains untested and the administrative costs and complexity of the deals may prevent widespread acceptance in the Euro-markets.

Turning to the custody of Euronotes, about 85 percent of all the notes were held by Euro-clear, Cedel, Chase and First Chicago according to a survey by the Bank of England. The remaining 15 percent was presumably held by other custodians or directly by investors at their own custodians. At the time of the survey, estimated outstandings of Euro-notes came to $54 billion. (This does not include London CDs which came to $110 billion at that time.) Of the outstanding paper considered by the Bank

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[6] U.K. commercial banks are regulated by the Bank of England and for them there is no distinction between rated and unrated paper. If the home regulators of overseas banks, the banks, and the Securities Investment Board reach agreement on the regulation of branches in London, then these branches do not need to meet the TSA standards.

of England, 90 percent was short-term notes and paper other than CDs, while non-London CDs made up 8 percent and medium-term notes 2 percent.[7] Insufficient information makes it impossible to make a precise breakdown between issuance under committed and uncommitted programs, but the Bank of England estimated that notes issued under uncommitted facilities came to about three quarters of the total.

Euro-Certificates of Deposits

The London CD market developed earlier than Euro-commercial paper and, in contrast to ECP, has been subject to specific statutes and guidelines. The Finance Act of 1968 made provision for the issuance of CDs by banks in the United Kingdom, while later acts extended this provision to building societies. The Banking Act of 1987 controls the taking of deposits within the U.K. Any issue of CDs must be made in accordance with this Act, which sets strict limits on who can take deposits.[8]

Until 1989, banks and other institutions approved by the Bank of England raised funds in short-term securities markets in London only in the form London CDs, which are negotiable bearer instruments. The Bank of England set standards for the issuance of London CDs, with the objective of achieving as much homogeneity as possible at the primary issuing stage. Thus, orderly trading conditions would be encouraged and investors would be more certain of the nature of the instrument traded. As a wholesale

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[7] Non-London CDs are those issued by institutions which are not authorized under the Banking Act 1987 but which are still intended to trade in the United Kingdom. Under the Bank of England's new 1989 guidelines, these may be traded provided they meet certain conditions.

[8] For example, in order to allow the creation of a sterling commercial paper market, the Act had to be changed in 1986. Otherwise corporations would have been open to charges of unauthorized deposit-taking. In the case of Euronotes denominated in currencies other than sterling if the funds are received outside of London they are not subject to the Banking Act. If the issue takes place in the U.K. and the funds are received in the U.K., even in non-sterling currencies, it could be construed as deposit taking if done on more than an occasional basis, say once or twice a year.

market, London CDs are supervised by the Bank of England's Wholesale Markets Supervision Division. The Bank of England also expects to be informed in advance whenever any bank first issues London CDs.

London CDs, as a result of this regulatory environment, have tended to be more standardized than Euro-commercial paper. Until recently, Euro-commercial paper was totally unregulated. There were no legal barriers preventing corporations or sovereigns from setting up ECP programs. In contrast to the treatment of London CDs, there have not been any guidelines concerning the issuance of ECP.

The London CD market is likely to retain its distinctive characteristics even though the Bank of England recently allowed deposit-taking institutions to issue short-term paper other than CDs.[9] One of the conditions for issuance of other types of instruments, such as ECP, is that it would be clearly identified. London CDs are to remain explicitly defined and distinct from other short-term paper. Only institutions authorized to accept deposits under the Banking Act 1987 or by building societies authorized under the Building Societies Act 1986 are to issue CDs in the United Kingdom.

Euro-certificates of deposit or London CDs have been traded for over 20 years, with the first dollar CD being launched in London in 1966. From the late 1970's until the early 1980's the Euro-CD market grew rapidly reaching almost $100 billion at the end of 1983. As seen in table 2, outstandings at the end of 1988 were not much higher than 5 years earlier. Recently, banks have been slowing the growth of assets and have been relying less on CDs for funding. While there has been some increased issuance of London CDs by Japanese banks, this has been offset by lower

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[9] Certificates of Deposit and Other Short-term Paper Issues By Deposit-Taking Institutions, Notice Issued by the Bank of England on March 31, 1989.

issuance by U.S. and other banks. With attention focused on capital ratios and pricing in syndicated loans still tight, material growth in London CDs outstanding in the near future is unlikely.

U.S. participants, issuers, dealers and investors have tended to dominate the market. A reasonable amount of issues are directly placed, with the remainder being handled through brokers. For a long time U.S. banks were the largest issuers of Euro-CDs, while U.S. investment banks and commercial banks were the top dealers. More recently Japanese banks have become the largest issuers and in mid-1988 had issued 40 percent of all Euro-CDs outstanding, twice the share of U.S. banks. In the past, the top ten U.S. money center banks traded on-the-run, but currently it somewhat misleading to describe them as such, because investors distinguish among the banks. Now, the top 12 or so Japanese banks trade on the run, with a bid/ask spread of about 3 basis points. There has been some geographical broadening of issuers, with more acceptance of Southern European banks for example.

Euro-certificates of deposit can be issued under a medium term arrangement, either underwritten or not, or on a tap basis.[10] The tap issues are traded in physical form, with a two day settlement period. The conventions for settlement in the market reflect those in the Euro-deposit market as both are dominated by the same players. A trade executed on Monday is, for example, settled on Wednesday (spot basis). Settlement for dollar CDs is made by payment of funds in New York, usually through CHIPS although some payments are made on Fedwire. The actual payment is made for value the same day the CD is presented in London for payment. First Chicago Clearing Centre is currently the major clearing and settling organization, because the only other competitor, Chase Manhattan, dropped

[10] Tap issues are a method of issuing paper as required in regular amounts. The issuer will approach investors to determine the demand and then sell paper from its stock or create new paper.

out of the physical business in mid-1988. Only a small share of London CDs, maybe 5-10 percent, is held in Euro-clear or Cedel. First Chicago probably holds over half of the remainder in custody, while the rest of the securities are held within the City of London in other depositories.

The major dealers of the Euro-CD markets are U.S. investment and commercial banks. There is an active broker market that handles about one-third of total turnover. The institutions that broke Euro-CDs are the same that are active in money and foreign exchange markets. The issuing banks post rates for CDs and invite traders for bids. The brokers quote on-the-run CDs on a no-name basis. A few banks have CD programs which are underwritten, but most deals are done on an invitation basis and are not underwritten. In the early days of the market, London discount houses were active as brokers, but now their role has diminished, and they focus more on retailing CDs. Dealers and discount houses actively trade Euro-CDs among themselves. In the past the bid/ask spread was usually 10 basis points, but now it can narrow to 1 or 2 basis points.

Secondary market trading of Euro-certificates of deposit is active. By one estimate, daily turnover could be as much as $5 billion. Individual trades are usually $5 million or more and $20-30 million is not unusual, particularly for shorter maturities. The investor base is narrower than the base for ECP and the market generally is more oriented towards London. Banks play a larger role as investors than in the ECP market. Although probably not to the same extent as in the case of ECP which can be rated, investors in London are becoming more selective about whose paper they will buy. London CDs may be rated, but it is not common.

Euro-CDs can have maturities of 1 day to 5 years, but the bulk of issuance is between 3 to 6 months. Most Euro-CDs are denominated in dollars, although there have been issues denominated in yen, Australian and Canadian dollars, SDR and ECU. From the point of view of dealers, some kind of hedge is needed in order to manage a position in, say, Australian

dollars or ECU-denominated CDs. Either an exchange-traded contract, similar to Eurodollar futures, or a liquid actively traded instrument that market-makers could depend on are needed. Forward rate agreements are not liquid enough. One participant thought that the development of an active short-term ECU market in London, stimulated by the United Kingdom's Treasury bills denominated in ECU, could encourage ECU-denominated CDs. This could be assisted if an RP market in ECU instruments develops.[11]

London CDs can be fixed or floating rate interest. Most issues currently are fixed rate interest bearing, as the floating rate CD market has been virtually at a standstill since the collapse of the perpetual rate note market in 1986. Zero coupon CDs have apparently never caught on in London.

Tiering in Euro-CD rates has apparently lessened somewhat over the last few years but nonetheless continues. U.S. money center banks still command the best rates, followed by the best European names and the Japanese close behind. As mentioned earlier, however, there is more differentiation among the U.S. banks' paper than among that of the Japanese. In all, the spread among actively-traded issues is only 10 to 15 basis points. (U.S. banks have reduced their issuance in this market considerably in the last few years. If they had not, they might be paying relatively more now.)

The British Bankers' Association (BBA) has set out recommended guidelines for London CDs, whether denominated in sterling or in other currencies, whereas there are no guidelines for ECP. These 1987 guidelines cover requirements for the security, the printing and dealing of CDs in London. Euro-CDs must meet London Good Delivery standards, a copy of which is attached to this paper. The BBA recommends that the

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[11] The Bank of England in March 1989 announced that it would be promoting a repo market in ECU treasury bills in order to increase liquidity and avert settlement problems.

CDs be held in London for security purposes and only with institutions with adequate protection and capabilities to control security arrangements and protect holders against the dangers of fraud, forgery, theft, etc.

Some non-London CDs are also traded in London. These are CDs issued by a non-U.K. bank from outside the United Kingdom.[12] For example, a Scandinavian bank without a London branch could issue a CD from its home office, or from Luxembourg. Under the Bank of England's new guidelines, non-London CDs may be traded in London subject to several conditions. They must be clearly labelled and conform to the BBA's standards for London Good Delivery. Also, if a U.K. issuing or paying agent is used, this must be made clear to the purchaser. The size of this market is not well-known, but was estimated at $2 billion by the Bank of England in mid-1987.

No interest is withheld on London CDs meeting the normal standards and with maturities of over seven days, nor is there a stamp tax levied on London CDs. However, banks acting as maturity-proceeds-collecting agent for non-London CDs in London must certify beneficial ownership at maturity, or have tax on interest withheld unless they get approval as recognized clearing systems by the Inland Revenue Department. Euro-clear, Cedel and First Chicago have been recognized as clearing systems.

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[12] Some banks have ECP programs set up by their head office outside of the United Kingdom and issue either ECD or ECP, whichever has the lowest cost.

Part II

FIRST CHICAGO CLEARING CENTRE

Role of FCCC in Clearing and Settling

First Chicago Clearing Centre (FCCC) plays a key role in the clearing, settling and safekeeping of U.S. dollar denominated short-term physical securities in London. About 12 years ago, First Chicago started offering clearing and settlement services in London when there was no clearinghouse for CDs, and large numbers of bearer CDs moved on the street. FCCC's goal was to set up a clearinghouse arrangement priced attractively enough so that it could use book-entry accounting. In the late summer of 1988, First Chicago's main competitor in clearing and settling London CDs, Chase Clearing, ceased operations. All of Chase's customers are currently participants in FCCC. With the exit of Chase from the business, FCCC may have room for significant economies, particularly to the extent that more trades are cleared and settled internally.

First Chicago Clearing Centre also offers a number of services, including clearing, settling and safekeeping, for the Euro-commercial paper market in London. Its role in that market as a whole, however, is more limited than in the case of London CDs. This reflects, in part, a shift of ECP into the Euro-clear/Cedel environment and a movement away from physical

securities.[13] As mentioned earlier, Euro-clear and Cedel, because their operations are outside of the U.K., have an advantage over FCCC as they are not subject to a U.K. turnover tax on securities traded in book-entry form. FCCC does clear, settle, and safekeep physical ECP and First National Bank of Chicago (FNBC) in London acts as depository for Euro-clear for ECP. FCCC also acts as issuing and paying agent for both ECP programs and, on a more limited basis, London CD programs.

First Chicago Clearing Centre (FCCC) is not separately incorporated and is part of First Chicago's London branch. However, FCCC is physically located within the City of London, several miles away from the branch. Such a location for FCCC is necessary because of the physical settlement of securities cleared through FCCC.[14] FCCC reports directly to the branch manager, and also maintains a close relationship with FC's Service Products Group, run in Chicago. FCCC is run as a separate business entity, with its own marketing, operations and product design. It has its own nostro accounts for dollar and yen payments.[15] It does, however, use the branch's mainframe computer. Customers have demand deposit accounts at FCCC which are on the books of FNBC London. The accounts are used only for security-related transactions. The separate physical location of FCCC helps in the attribution of fully-loaded costs to the operations. FCCC has an accurate picture of its costs and earnings from its securities processing.

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[13] Although physical notes do exist, they are essentially immobilized. Settlement is done on a book-entry basis.

[14] As a matter of practice, delivery of physical securities must be within the City of London, about one square mile. In addition, although there are apparently no laws forbidding the movement outside the U.K. of CDs, this is discouraged by market practice.

[15] A nostro account is an account that a bank has in another country at its own office or with another bank to handle clearing and settling in the local currency.

Most of FCCC's customers are financial institutions, banks and securities houses, although it does have six U.S. non-bank corporate customers. Basically any participant in the money market is a potential customer as long as it meets certain credit standards. Currently FCCC has some 350 participants and 130 issuers of Euro-commercial paper.[16] Participants in FCCC must be approved by the London branch and must pass the bank's credit screening. Issuers of ECP and CDs must also be approved by First Chicago's credit officers. The credit screen is reviewed every six months and is tighter for issuers than for participants because First Chicago will have greater exposure to the issuer. If the issuer needs a higher credit limit, it must go through a credit evaluation process. There is no authority at FCCC to make credit decisions; these decisions are made at the branch. Issuers know their limits. On issuing, the borrowers usually do not bump up against their credit limits. Exposures to banks as a result of trading securities in London are subject to overall credit limits established by First Chicago. About 40 to 50 banks in London act as depositories for short term securities but much of the business is handled by only half that number. FCCC also has delivery limits for different banks in London, but these banks are not informed of the limits.[17]

The bulk of the securities cleared by FCCC are denominated in dollars: FCCC staff estimates that 85 percent of FCCC's volume is in dollars, ten percent in sterling, and the remainder in various currencies, including yen, ECUs, and Australian dollars. In light of this preponderance, the focus of this paper will be on U.S. dollar transactions. External transactions, i.e., where one party, buyer or seller, is not a participant of

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[16] The range of participants in the London CD market is narrower than for participants in Euro-clear or Cedel, which each have over 2,000 members. Not all of these, however, will be active in short-term paper.

[17] The delivery limits are set within a global framework. FCCC is allocated a segregated limit within the total. If the limit is about to be exceeded, First Chicago does not deliver the security, but does contact the bank explaining that it has reached a limit.

FCCC, are settled through nostro agents. Dollar payments settle over CHIPS via First Chicago's New York Edge subsidiary, First Chicago International (New York) ("FCI"); transactions in other currencies settle through nostro agents in the home country of the currency. When both parties in the transaction participate in FCCC, the transaction is handled through book-entries at FCCC and there can be sizable reductions in the cash flow through nostro accounts through netting.[18]

FCCC is currently averaging 400-500 transactions a day for both CDs and ECP, compared with an average of 600 in 1987. In October of 1987 a peak of 1,300 was reached. Dollar payments generated by FCCC average about $6 billion a day currently, all of which goes through the branch's nostro account in New York. About two thirds to three quarters of these payments go over CHIPS, the remainder over Fedwire. (This $6 billion in payments is after FCCC nets daily transactions with its customers and it varies considerably from day to day. Recently, the payments netting has been running at $2 to 2.5 billion.[19]) The payments do not include ECP redemptions or issuance, which are about $3 billion. Roughly two thirds of the payments are generated by CD transactions, one third by ECP. The peak of such payments was $14 billion.

In the following pages, the interaction of FCCC's London securities operations with the payments system in the United States will be reviewed, with emphasis on how the various risks are managed. The examples are, however, highly simplified, particularly to the degree that

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[18] The reduction in cash flows occurs, for example, when there is a chain of transactions. A buys the CDs from someone outside FCCC and then sells to B inside, who sells it to a fourth party not in FCCC. There is a cash flow from the fourth party to FCCC's nostro account and another out of FCCC's nostro to A's counterparty. There would be no cash flow from B to A across FCCC's nostro account.

[19] Netting is bilateral, between FCCC and its customers, but because of FCCC's central position in the market, the netting has implications for systemic risk, similar to that in multilateral netting.

customers typically have many transactions. FCCC and First Chicago International (FCI) in New York do not manage risks on a payment by payment basis, as might be suggested if only one of the following diagrams is considered. Rather they look at the total flow of funds across FCCC's nostro account.

Before considering the individual transactions, it is worthwhile considering the timing of various money flows and how FCCC manages the associated risks. When FCCC makes payments, the timing is not directly related to the underlying transactions.[20] FCCC releases payment instructions to FCI New York throughout the day. Generally speaking, payment instructions to FCCC customers are not released until the end of the day in London. Depending upon market activity, the last payment instructions should be received in New York by 2:00 P.M. New York time. There is no requirement to make these payments immediately so long as they are made by close of business in New York.

The timing of payments in New York is managed by FCI. FCI may either immediately effect payments through CHIPS or schedule payments in order to manage both FCCC's position at FCI and the bank's overall position. If it suits the bank's overall position, FCI management may effect payments from FCCC's account even though it creates a large daylight overdraft. There is, however, no FCCC business reason for any payment to be made early. (FCI New York has recently strengthened its management of general daylight exposure as a result of improved procedures, upgraded software and implementation of CHIPS MONITOR.)

Turning to the receipt of funds by FCCC, there is no obligation by counterparty agent banks to pay FCCC early, except in the case where FCCC is the issuing and paying agent and funds must be paid in by 10:00 A.M. New York time. Counterparty custody banks have timing similar

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[20] The payment will be made sometime after FCCC has received the security in London and before the end of business in New York.

to FCCC. By 1:00 P.M. New York time they would have instructed their agents to affect payment. (This is earlier than FCCC because of the extra processing FCCC does on customer balance control and netting.)

In cases where FCCC is the issuing and paying agent for maturing paper and where there are third party maturities, credits to FCCC's account may be generated earlier in the day. For the majority of programs where FCCC is the issuing and paying agent, it requires the issuer to pay cover for maturity proceeds by 10:00 A.M. New York time (3:00 PM London time). Clearly, this is before proceeds are paid away to investors and consequently no intraday exposure is generated. In the case of third party maturities, FCCC presents maturing CDs and ECP held in custody to the paying banks first thing in the morning, London time. Instructions by the paying banks in London usually reach their nostro banks in New York by New York's opening. Thus, these payments are often "first on line" and many of these payments are received early by FCI through CHIPS.

FCI in New York thus plays the key role in managing the daylight exposures generated, but procedures initiated by FCCC also significantly reduce the potential size of daylight exposure and gross payments across its books in New York. The netting of trades of participants with FCCC reduces the number of gross payments handled by FCCC as well as the potential intraday exposure. The majority of trades processed by the clearing centre are on behalf of customers who clear more than one transaction a day through FCCC. In excess of 95 percent of customers take the net position with FCCC and cover that only as allowed for in the "Terms and Conditions." For example, if a customer buys

$50 million CDs and sells $40 million he would owe FCCC only $10 million.[21] Under the netting arrangement, a single transaction settles all payments between FCCC and the customer during the day.

In addition, FCCC encourages customers to net new issues against same-day maturities; i.e., to use proceeds from new issues to pay for maturing issues. If managed correctly, this also reduces potential daylight exposure considerably. Netting issuance of ECP is having a growing impact on reducing daylight exposure, although two factors are delaying progress somewhat. Much of the ECP is swapped into other currencies, making netting difficult. Typically in swaps, several different banks are involved on each side of the transaction complicating any netting. The rapid growth of the market itself also limits the possibility of netting.

A growing share of internal CD and ECP transactions is also reducing the potential daylight exposure. These internal transactions between participants are book-entry processes which are not reflected by payments or receipts over FCI, New York. Over half of the secondary transactions processed by FCCC are internal, and nearly 20 percent of

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[21] If all trades were external, none with other participants, the cash flow would be:

(in millions of dollars)
FCCC Nostro Account

	Debit	Credit
External Purchase	50	
External Sale		40
Net transfer from customer	—	10
Total pay/receives	50	50

With no netting, payments would be made on a transaction by transaction basis, thereby generating a greater volume of payments. Under the contractual relationship established in the "Terms and Conditions," a participant opens a cash account with FCCC which is credited and debited in connection with the participant's security transactions. The balance is monitored during the day in London and a minimum balance is required at the end of the day.

primary purchases and maturities are internal. Taking the above example and assuming 50% of transactions were internal, the daylight exposure for that customer would be $25 million.[22]

Clearing and Settling Euro-Certificates of Deposit

The clearing and settling of Euro-certificates of deposit denominated in U.S. dollars presents a number of challenges. The securities move in physical form within the Square Mile of the City of London, while payment occurs in New York through CHIPS or Fedwire. Short-term sterling securities have traditionally traded in physical form and the security side of London CDs conforms to practices in sterling instruments. The British Bankers Association has issued guidelines for the type of paper used for London CDs and on clearing and settling. The payments side of short-term dollar instruments, however, is not at all the same as for sterling instruments. Payments for sterling instruments are by Town Clearing Checks.

The movement of securities and the movement of funds for Euro-certificates of deposit are linked through a "letter of undertaking to pay." This transfers FCCC's risk from a participant or counterparty to one of a limited number of banks. The security only moves against an undertaking to pay by the bank receiving the security. Thus if FCCC

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[22] The effect, therefore, of netting and internal transactions, in this example, is a reduction of the maximum potential daylight overdraft by half. Clearly the fewer participants outside the system, the less the daylight exposure per transaction.

(in millions of dollars)
FCCC Nostro Account

	Debit	Credit
External Purchase	25	
External Sales		20
Cover Transfer from customer		10
Total	25	30

(The apparent unbalanced status is washed out when taking into account the other parties to the internal book-entry buys and sells, i.e. $25 million internal purchases and $20 million internal sales. The cover transfer is external as the customer brings in funds to settle with FCCC.)

delivers out a London CD, its messenger simultaneously receives an undertaking to pay dollars in New York by the receiving bank. When FCCC receives a security, it simultaneously delivers out an undertaking to pay the bank that has delivered the securities. Later in the day in New York, funds move to fulfill the undertaking to pay. This type of document has been used for many years with few problems although it has not yet been tested in court.

In the case of a purchase of a London CD in the secondary market from a counterparty not a member of FCCC, participants send instructions concerning both CDs and ECP to FCCC by authenticated S.W.I.F.T. message, authenticated telex, letter signed by an authorized signatory or by its cash-management product, First Cash 450.[23] About 45 percent are received via First Cash, 5-6 percent through S.W.I.F.T., about 8 percent in the form of letters and the remainder through authenticated telex. For U.S. dollar transactions, the cutoff is 9:30 A.M. London time on settlement day. About 50 percent of the CD orders come from the United States, 40 percent from London and 10 percent from other countries.[24] FCCC is streamlining the instruction flow and is upgrading its cash management product so that participants will be able to monitor their transactions on a real-time basis.

The fail rate is less than 1 percent, even though the initial error rate for transactions requested by customers is about 20 percent on balance. The 9:30 A.M. deadline allows FCCC most of the day to correct errors, although for the U.S. errors cannot be fixed until the afternoon when the New York market is open. Currently, FCCC does not price transactions to penalize customers for high fail rates.

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[23] First Cash 450, an FC product using GEISCO, is being phased out in 1989. It's replacement will be linked to S.W.I.F.T.

[24] This means the instructions must be input the day before in New York because at 9:30 A.M. London time, New York is still closed (4:30 A.M.).

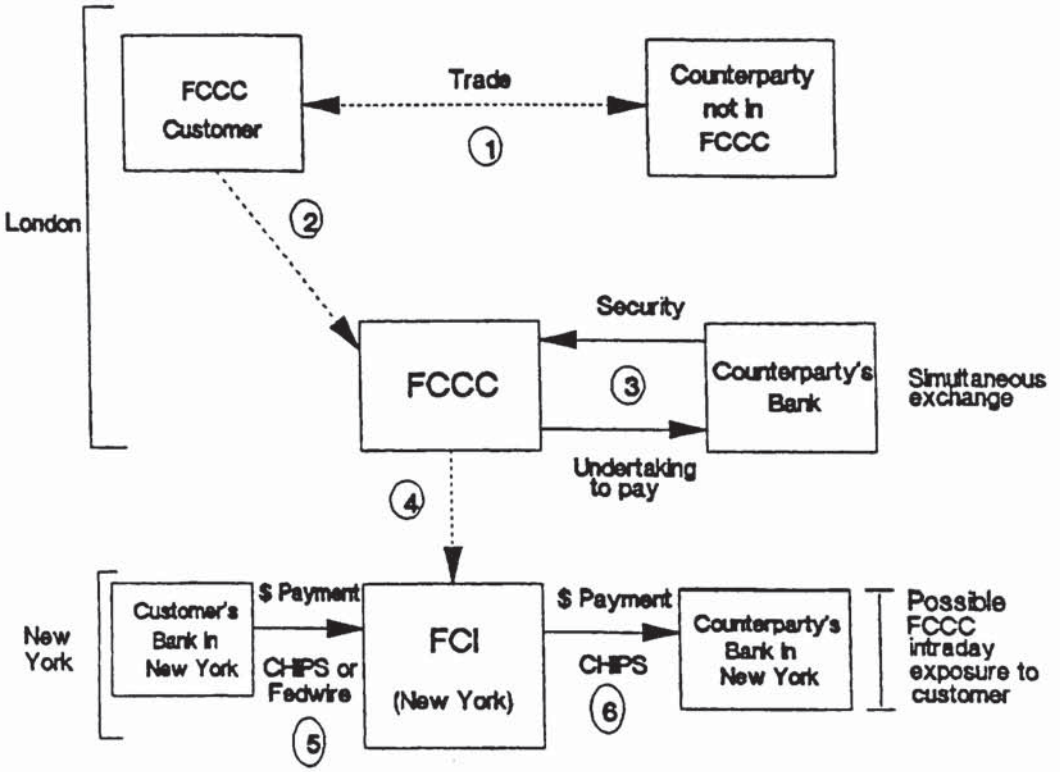
Purchase of a London CD from Counterparty Outside FCCC

In the case of a customer's purchase of a London CD from a counterparty who is not a member of FCCC, the instructions are due from customers by 9:30 A.M. on settlement day. (Settlement day is the second business day after the trade date, indicated as 1 or diagram 1 on page 28.) FCCC will be told to expect delivery of a certain amount of specific securities from a particular bank in London and to make corresponding dollar payments to that bank. At 9:30 A.M., clerks check the information on incoming instructions and enter it into First Chicago's computer through a dedicated line. The inputted information is then checked against the customer's instructions. By about 11:00 A.M. a fanfold (printout) is generated that serves as working instructions for the rest of the day. The fanfold covers all securities movements and most payments. A running balance is kept of payments between FCCC and each customer and one net payment is made at the end of the day. By 11:00 A.M. FCCC reconciles all receipts and balances at the nostro agent for the previous day value against its own records. Then by 1:00 P.M., FCCC knows the projected end of current day cash balance for each customer and has identified potential problems.

During the afternoon in London, the CDs are delivered to FCCC as shown in step 3 in the diagram. FCCC will only accept approved paper. In exchange for the CDs, FCCC simultaneously gives the delivery messenger an undertaking to pay the counterparty's bank the specified amount of dollars in New York on the same day. After the physical CDs are checked and verified, payment instructions are released into FCCC's computer. The release updates customer accounts and generates payment instructions for First Chicago International (FCI) in New York.

DIAGRAM 1:

A Customer of FCCC Buys a CD from a Counterparty Outside of FCCC



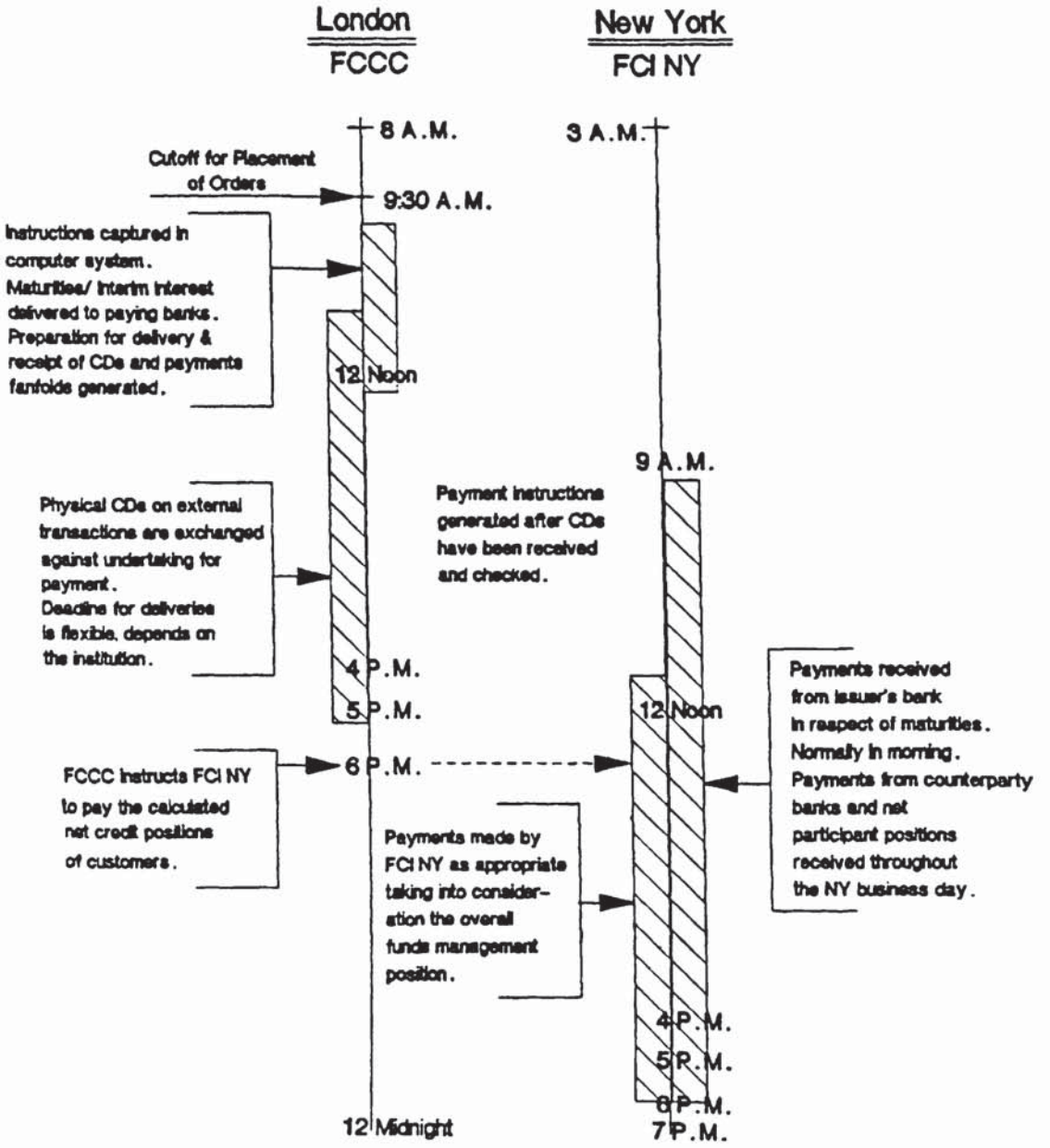
1. Trade executed over telephone on trade date T.
2. FCCC must receive the instructions from its customer by 9:30 AM on T + 2, the settlement day. Instructions are to receive CDs from counterparty's bank in London, to deliver payment of dollars to counterparty's bank in New York and debit the customer's bank account at FCCC.
3. A messenger from the counterparty's bank delivers the CD to FCCC London in exchange for an undertaking to pay dollars by FCCC. (Afternoon T + 2)
4. After receipt and verification of CDs, instructions are sent to FCI NY to pay and receive. (Late afternoon U.K. time)
5. Customer bank pays dollars to FCI to cover payment to counterparty.
6. FCI pays dollars to counterparty's bank extinguishing undertaking to pay.

FCI in New York may, in the management of its overall daylight overdraft position, pay out funds to the counterparty's bank before funds are received from FCCC's customer. Thus, an intraday overdraft could arise, as seen in the diagram in items 5 and 6. For United States dollars, payment orders by FCCC start being made over SWIFT, queuing up, about 12:00 P.M. London time, with the bulk being made from 2:00 P.M. to 3:00 P.M. (9:00 A.M. to 10 A.M. in New York) and the last ones by 5:30 P.M. London time. Participants generally make payments between 1:00 P.M. and 3:00 P.M. New York time (see Diagram 2 on page 30). On the morning after settlement, First Chicago London reviews all receipts. Any fails will be identified by 11:00 A.M. London time and customers are contacted by New York opening to obtain a speedy resolution.

FCCC faces both a credit and a liquidity risk because it pays before receiving funds. The credit risk is reduced because FCCC holds the securities transferred, and it has a continuing lien on those securities. FCCC assumes that the customer is paying the market price for the securities and does not require any haircut. FCCC also has the right to liquidate the customer's whole portfolio held in safekeeping in the event of problems. FCCC does not impose a cap on the secured credit a customer can incur but it does monitor it throughout the day. Liquidity risk is managed as part of the general overdraft arrangements of First Chicago and FCI in New York.

If a participant fails to pay for a security, FCCC will go back to the participant and put him in overdraft. The cost of an overdraft is 2-1/2 percent over U.S. prime for any amount below the minimum balance of $5,000. The customer account is also blocked so the security cannot be transferred. Generally, payment fails are cleared up the next day. The majority of fails involve banks to whom FCCC delivered securities and who paid incorrectly, using the wrong account number or paying the wrong bank.

DIAGRAM 2:
Clearing and Settlement
Eurodollar Certificates of Deposit


London
FCCC
New York
FCI NY
8 A.M.
3 A.M.
Cutoff for Placement of Orders
9:30 A.M.
Instructions captured in computer system. Maturities/ interim interest delivered to paying banks. Preparation for delivery & receipt of CDs and payments fanfolds generated.
12 Noon
9 A.M.
Physical CDs on external transactions are exchanged against undertaking for payment. Deadline for deliveries is flexible, depends on the institution.
Payment instructions generated after CDs have been received and checked.
4 P.M.
5 P.M.
12 Noon
Payments received from issuer's bank in respect of maturities. Normally in morning. Payments from counterparty banks and net participant positions received throughout the NY business day.
FCCC instructs FCI NY to pay the calculated net credit positions of customers.
6 P.M.
Payments made by FCI NY as appropriate taking into consideration the overall funds management position.
4 P.M.
5 P.M.
6 P.M.
7 P.M.
12 Midnight

Market practices for the purchase of primary-market CDs differ slightly from those for secondary-market purchases. Primary market CDs are usually issued by a bank's own London branch, although FCCC does handle some issuance of primary CDs for customers. The practice is for purchasers of a primary-market CD to collect the CD or to have an agent collect it. Thus the customer (purchaser) gives FCCC instructions by 9:30 A.M. to collect the CDs from the issuing bank. FCCC has a letter of undertaking to pay made up for the amount to be paid for the CD and has two authorized signatures affixed to it. First Chicago signs the letter as principal. One of FCCC's messengers goes to the issuing bank, picks up the physical security and gives the issuing bank the letter of undertaking to pay. The rest of the process is exactly the same as in the example cited above concerning the secondary market.

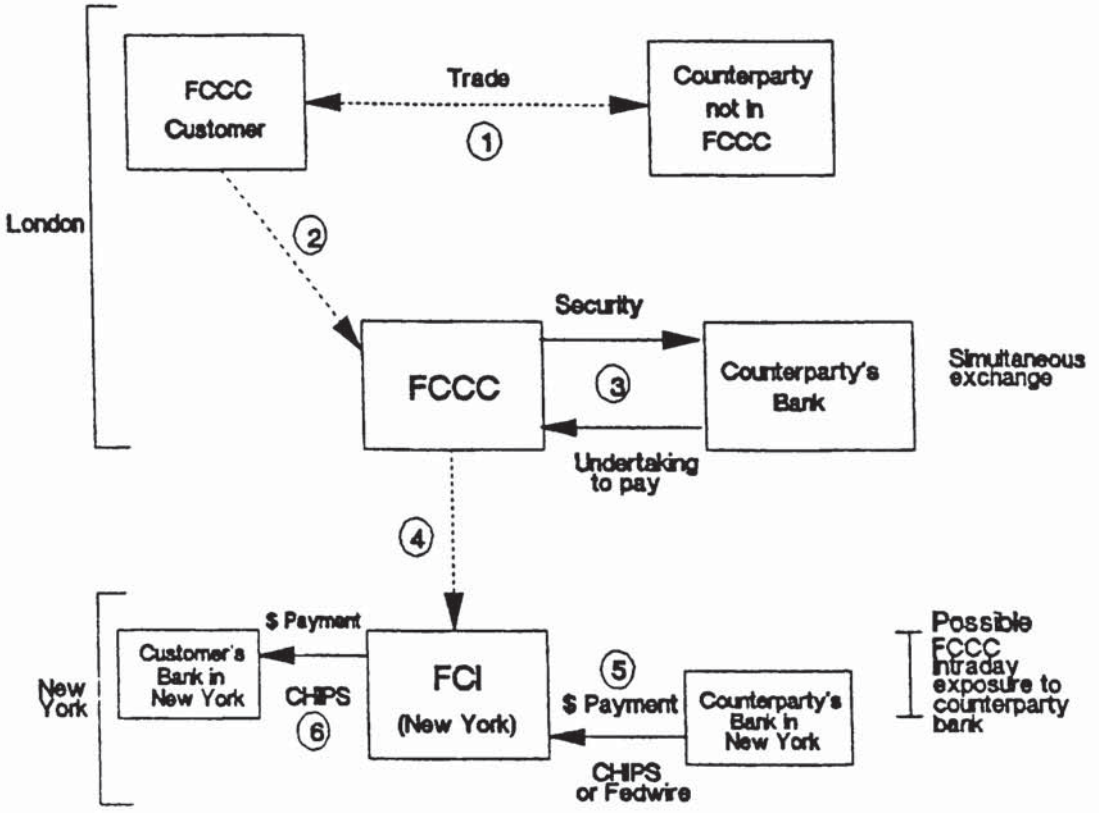
Sale of a CD to a Counterparty Outside FCCC

In the case of a participant selling a CD to a counterparty outside FCCC, the seller sends instructions concerning the delivery of the security in the same way as for a purchase (Item 2 in diagram 3 on page 32). The instructions are entered into FCCC's computer and are included in the daily fanfold. Instructions about the customer's payments come into FCCC separately in the morning of settlement day in London. A running balance is kept for payments between FCCC and the customer and this is the basis for a final payment each day.

Using instructions in the fanfold, FCCC will deliver the CDs to the counterparty's bank in London. The CDs are exchanged for an undertaking to pay dollars in New York on the same day by the counterparty's bank (Item 3 in diagram 2). After the messenger returns in the afternoon in London with the letter, the signatures are examined. If everything checks out, payment and receipt instructions are sent to FCI just as in the earlier example (Item 4 in diagram 3).

DIAGRAM 3:

A Customer of FCCC Sells a CD to a Counterparty Outside of FCCC



1. Trade executed over telephone on trade date T.
2. Instructions must be received by 9:30 AM on T+2. Instructions are to deliver CDs to counterparty's bank, to expect payment of dollars from counterparty's bank in New York and to pay the proceeds to the customer's bank in New York.
3. A messenger delivers the CD to the counterparty's bank in exchange for an undertaking to pay dollars in New York that same day in afternoon London time.
4. In mid- and late-afternoon London time, instructions are sent to FCI in New York to pay to the customer's account and expect funds from counterparty's bank in New York.
5. Counterparty's bank pays FCI dollars in fulfilment of the undertaking to pay over CHIPs or Fedwire. If this is in the late afternoon, there could be an FCCC intraday exposure to the counterparty bank.
6. FCI pays proceeds to customer's bank in New York over CHIPs in accordance with its overall risk management.

In our highly simplified example, funds will be paid to the customer's bank on the one side, while funds are paid into FCI New York from the counterparty's bank in New York. FCI will manage the intraday exposure as part of its overall position. It may decide to create a daylight overdraft, if this fits in with the overall position. (As mentioned earlier, there is a considerable amount of netting and a fair number of internal transactions so that the actual amounts being paid in New York are smaller than the gross transactions.) In order to manage the credit risk, FCCC requires a letter of undertaking--a guarantee of payment--from the recipient's bank. This credit is not secured. FCCC imposes a limit on the unsecured credit that may be extended to these banks and it is monitored throughout the day. If FCCC does not receive funds, FCCC first goes to the deliverer and informs it that the bank which signed a letter of undertaking to pay did not do so. The participant is expected to deliver the funds. FCCC will reverse the credit to the selling participant if funds are not received. FCCC can also make a claim on the bank which signed the letter of undertaking to pay. The limits on unsecured credit extended to banks are reviewed by First Chicago at least every six months and these apply whenever FCCC delivers securities out of its vaults.

Internal CD Transactions

When both the buyer and seller are participants in FCCC, the transaction is internal. Almost half of FCCC's transactions fall into this category. The buyer and seller's instructions will arrive at FCCC just as in the earlier cases. The instructions are then entered into FCCC's computer system, which runs on an on-line basis. As soon as the second side of the trade is entered, the system tries to match the two sides. When the fanfold is run later in the morning, it shows the matched trade. If a trade does not match, it is shown separately and FCCC goes back to the customer to correct the problem.

The payment between the two parties is made within FCCC in London and does not cross the books of FCI in New York. There may, however, still be an intraday exposure generated as a result of the trade. The purchaser must pay funds into FCI, which the seller may want to pay out. The payment and receive instructions will be sent to FCI in London afternoon just as in the earlier examples. To the extent that FCI pays out over CHIPS for the seller before funds are received, there is an intraday exposure. FCCC, however, has a continuing lien on the security to cover this exposure and the liquidity risk is managed in the same way as in the earlier examples.

Other Aspects of London CDs

FCCC offers several other services supporting the London CD market, including the handling of interest payments, the redemption of CDs and the pledging of CDs. FCCC's computer system is programed to generate interest payment information and maturity dates and informs the issuing and paying bank. London CDs have a grid on the back and boxes are checked off to show the payments of interest. A messenger will take the CD to the issuer who will check the grid and return it to the waiting messenger.

For third party maturities, FCCC presents the maturing paper to the paying bank first thing in the London morning. Instructions from the paying bank in London usually reach their nostro banks in New York by the start of business in New York. These payments are usually first in line and many of these payments are received early by FCI. Otherwise the management of credit and liquidity risks are similar to risks on sales out of

FCCC. FCCC looks directly to the issuer and hence the credit review for issuers is particularly tight. FCCC also has recourse to the participant in the event of non-payment by the issuer at maturity.[25]

FCCC customers may pledge CDs when they have borrowed funds using the CD as collateral. In fact, there is not much pledging of securities. The market value of securities is used for the pledge. There is no haircut, reflecting the short-term nature of the transaction. FCCC does not lend securities, nor does First Chicago. This reflects market practice, as there is no lending of London CDs.

Euro-commercial Paper: Clearing and Settling

Primary market issuance and redemption are more important for Euro-commercial paper than for Euro-certificates of deposit, because there is a more active secondary market in ECDs. This section will focus on the clearing and settling of ECP at issuance and at maturity because the processing of secondary market trades is essentially the same as that of London CDs. First Chicago Clearing Centre offers a number of services related to ECP: it acts as issuing and paying agent; it acts as a depository for paper that is held through its own book-entry system; and it acts as depository for Euro-clear.

A large share of Euro-commercial paper issuance and trading is done on a book-entry basis in contrast to London CDs where the processing at issuance is largely physical delivery. Much of the secondary transaction processing of London CDs is, however, settled in book-entry form through FCCC. The extent of physical deliveries depends mainly on the distribution of custodians. With fewer custodians, deliveries decline. Eighty percent of FCCC's handling of ECP is on a book-entry basis; the

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[25] Only when FCCC is the issuing and paying agent does it look exclusively to the issuer.

remainder involves some physical deliveries. In all cases, however, there are physical securities underlying the book-entry system, although these may be in the form of a global note.

In contrast to the earlier examples of CD transactions, there will be no movement of physical securities outside of FCCC in the case of ECP and CDs handled on a book-entry basis. No undertakings to pay are needed as the paper is always in FCCC's office. The timing for securities "movement" and payments in the case of ECP held in book-entry form by FCCC is the same as in the case of London CDs and the risks are managed similarly. The timing for ECP distributed and held through Euro-clear, however, is different. Euro-clear processes its securities in a batch mode during the night of the day prior to the value date. FCCC and other participants in Euro-clear must consequently be prepared for settlement, in terms of securities and payments, on the day before settlement or value date This results in a different risk profile for FCCC, which will be considered in diagram 6. In addition, the risk profile for maturing ECP in Euro-clear or at FCCC will be considered in diagrams 8 and 9.

Euro-commercial paper currently comes in three forms; security-printed bearer notes, global notes and universal notes. With no uniform commercial code applying to ECP there are no formal standards for the paper. This means that considerable care must be exercised in delivering and receiving security-printed bearer notes. Both global notes and universal notes represent attempts to move away from the physical securities and to reduce the risks of fraud and error. In the case of global notes, investors hold a fungible interest in one note that represents the whole issue. To avoid being taxed on trades of these interests, the notes must be traded outside of the United Kingdom. From the point of view of custody, Euro-clear and Cedel can use global notes by working through common depositories. These are Chase and Morgan Guaranty for ECP. First Chicago is currently negotiating a legal agreement with Euro-clear and

Cedel to become a common depository for ECP. The existing depository relationship is between First National Bank of Chicago (FNBC) London and Euro-clear and the new common depository will also be in the name of FNBC London.

First Chicago developed Universal Notes to compete with Chase and Cedel. Universal notes are simply securities printed on non-security grade paper.[26] By one estimate, some 70 percent of the ECP is in security-printed form, 15 percent in the form of global notes and the remainder in universal notes. When investors want delivery of their securities, FCCC prints up the high-grade security paper.

About three quarters of FCCC's current ECP business is for Universal Notes and by one estimate there was some $4 billion of such notes outstanding in mid-1988. The main advantage of Universal Notes are their lower cost. Only if a delivery out of FCCC is required, does FCCC print up the high-grade security. Since about 95 percent of all notes that FCCC issues are never required to be delivered outside the system, this reduces considerably the expense of a program.

Issuance of Euro-commercial Paper

Clearing and settling for ECP can occur in three ways: with physical deliveries, with book-entry only involving FCCC, and with book-entry involving Euro-clear. In the following examples, FCCC acts as issuing and paying agent. As such, in all three cases, FCCC holds a blank stock of signed issues for ECP. At the time of issuance FCCC, as agent, countersigns to authenticate the blank stocks.

Physical Deliveries: FCCC

In the case where physical securities are to be delivered, after the dealer's bid on the paper is accepted, both the issuer and the dealer

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[26] Although there are no formal standards involving ultraviolet markings, double-signatures and the like for ECP, it is the practice to use security-grade paper.

send instructions on the issuance, amount and distribution to FCCC. (See items 1, 2, and 3 in diagram 4 on page 39.) These instructions must be received by the morning of the settlement day at which time they are matched and any discrepancies are eliminated. In the afternoon in London, FCCC delivers the note to the dealer's account and to whatever other holders are specified. Physical deliveries outside of FCCC are exchanged for undertakings to pay, just as in the case of London CDs. (See item 4 in the diagram.)

On the basis of the dealer's and issuer's instructions and completion of the deliveries of CDs, FCCC sends instructions to FCI New York to pay the issuer's bank and to receive funds from the dealer's bank. FCI will make the payment over CHIPS in accordance with its management of total liquidity. There could be an intraday overdraft created, if the covering funds from the dealer's bank arrive near the end of the New York day over CHIPS or Fedwire. This risk is reduced, however, by the dealer's bank guarantee that FCCC has received earlier. In the case of a problem, however, FCCC will actually look first to the issuer to try to arrange appropriate funds transfers. If possible, FCCC has the option of reversing the funds credit.

Book-entry ECP: FCCC

The issuance of book-entry ECP handled only by FCCC is the same as in the previous example, except that the securities never leave FCCC's office. The risk profile is the same except that FCCC has a continuing lien over the securities in the event of a failure to pay by the dealer. This case is illustrated in diagram 5 on page 41-42.

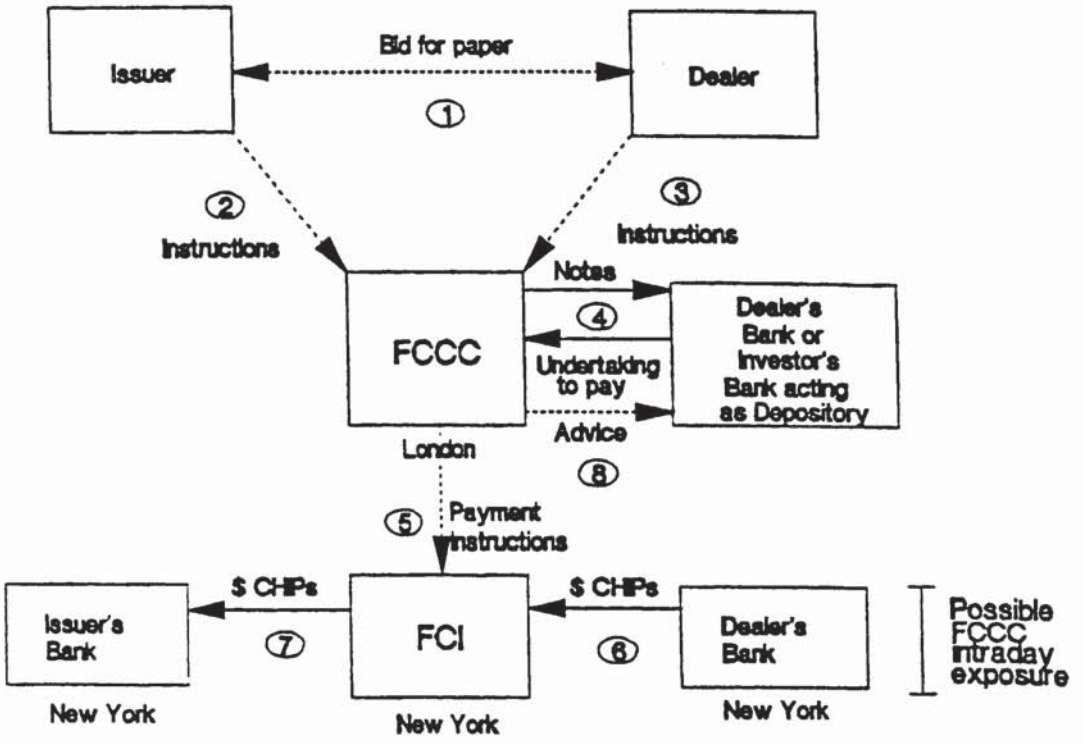
Book-entry ECP: Euro-clear

In the case of ECP distributed through Euro-clear, where FCCC acts as depository for Euro-clear as well as issuing and paying agent, the

DIAGRAM 4:

Issuance of Eurocommercial Paper

Physical Securities



① Dealer bids for ECP notes on day T.

② Issuer sends instructions to FCCC to issue notes, receive funds from dealers' banks and make payment to issuer's bank.

③ Dealer sends instructions to FCCC similar to those of the issuer, and the instructions are matched on T+1 or by the morning of T+2 at the latest.

④ FCCC delivers the notes to the dealers' accounts and to whatever other holders are specified. Deliveries outside of FCCC are against undertakings to pay.

⑤ FCCC sends payment instructions to FCI NY to pay the issuer's bank and receive funds from the dealer's bank.

⑥ Dealer's bank pays dollars over CHIPs or Fedwire to FCI.

⑦ FCI pays dollars over CHIPs to the issuer's bank in accordance with managing its total liquidity.

⑧ Advice of distributions is sent to the holders of ECP on the morning after settlement.

timing and risk profile of clearing and settlement differ. The dealer and issuer must send instructions to FCCC by noon London time on the day before settlement (Items 2 and 3 in Diagram 6 on page 44-45). These instructions are matched by FCCC and discrepancies eliminated by 3:00 pm that day. Meanwhile, FCCC has created the ECP and by 4:45 pm London time, still the day before settlement, informs Euro-clear that FCCC has created the securities.

During the night before settlement date, Euro-clear distributes the ECP against prepositioned cash or credit advices. On settlement day, FCCC either has cash from the dealer or has the securities in its escrow-type account at Euro-clear if the trade did not settle. If all of the paper did not move, FCCC would have to contact the dealer to arrange for dollar payments. To the extent that paper moved, payments are effected by Morgan Guaranty on behalf of Euro-clear usually during the later part of the business day in New York. FCI, usually during the later part of the business day in New York, will effect a payment to the issuer in accordance with its overall management of liquidity. Depending on how this is done and on how Morgan Guaranty manages its overall liquidity, there could be intraday exposures by FCI to Morgan Guaranty and by Morgan Guaranty to the Euro-clear customers.[27] In the past, if Cedel were involved, FCCC settled via Cedel's bridge with Euro-clear. FCCC is currently arranging a direct link with Cedel.

Maturing Euro-commercial Paper

Maturing ECP can also be physical, in book-entry form within FCCC, or held for Euro-clear. Information on the maturity, size and terms for all ECP for which FCCC acts as issuing and paying agent is stored on

[27] In the case where the payor uses a line of credit from Morgan Guaranty for delivery versus payment and the payor fails to make good, the credit risk is on Morgan Guaranty. The buyer is free and clear.

DIAGRAM 5:

Issuance of Eurocommercial Paper

Book-entry with FCCC

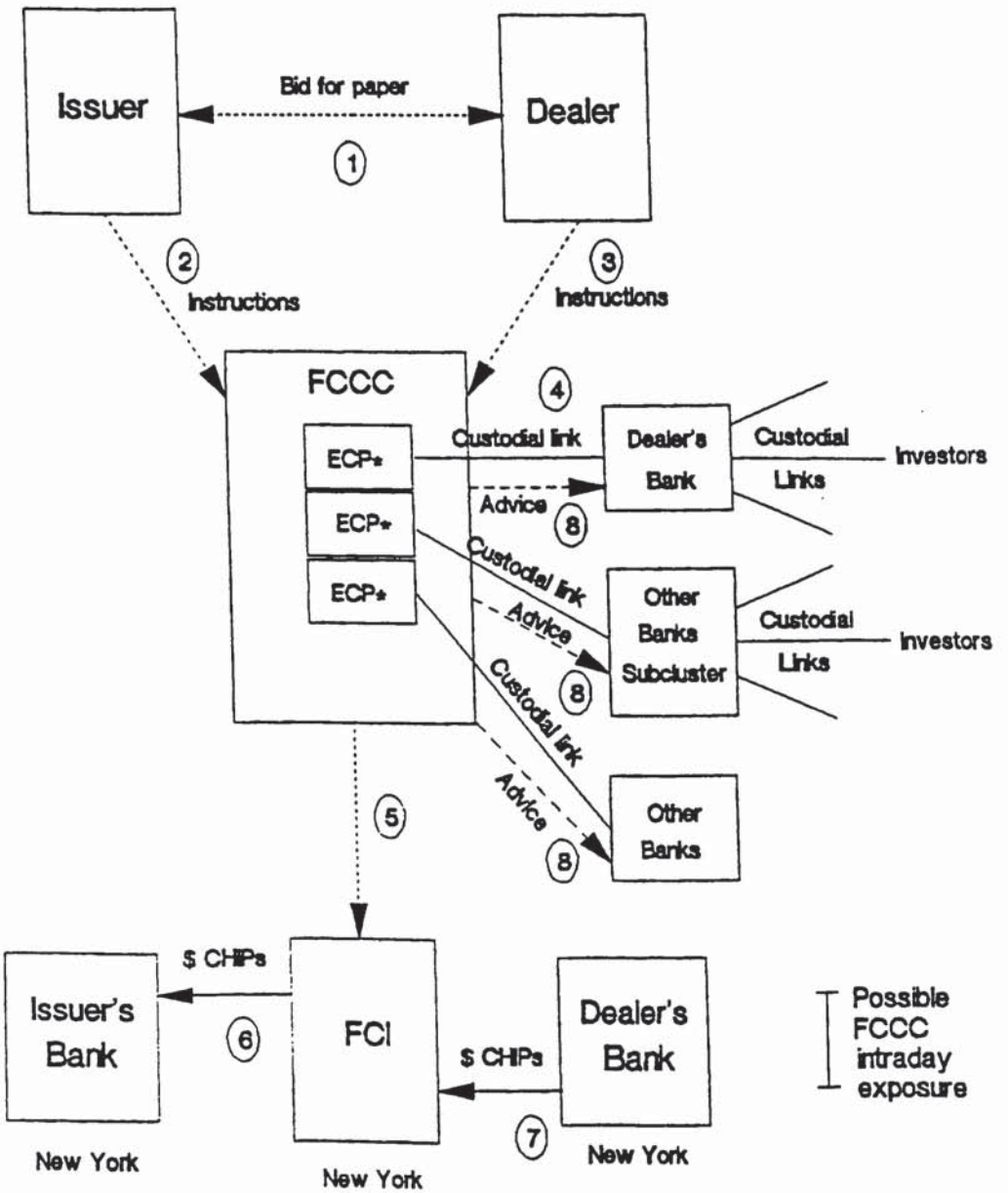


DIAGRAM 5:

Issuance of Eurocommercial Paper

Book-entry with FCCC

(Continued)

(1) Bid for paper on trade date, date of issuance.

(2) Issuer sends instructions to FCCC on issuance date T + 1.

(3) Dealer sends instructions to FCCC on issuance date T + 1, and these are matched against the issuer's instructions.

(4) FCCC makes book-entry changes for distributors in the afternoon, London time, of the settlement day.

(5) Payment instructions are sent to FCI NY in the afternoon, London time.

(6) FCI pays issuer's banks over CHIPS in the early afternoon, New York time.

(7) Dealer's bank pays dollars over CHIPS or Fedwire to FCI. Overdraft may occur

(8) FCCC sends advices to holders of the paper that it has been distributed on the morning of S + 1 in London.

Notes:
- No movement of paper outside of FCCC is involved; only ownership of paper on the books of FCCC.
- FCCC has only information on the first custodial linkage.
- Distribution is internal to FCCC.

FCCC's computer. Reports are run daily to determine what issues are maturing. In most cases, FCCC will initiate the redemption process according to the terms and conditions of its agreement with the issuer without new instructions from the issuer.

The credit risk for payments at maturity on ECP is not secured as in earlier examples nor is it guaranteed by a bank. Because the paper is maturing, it cannot serve as collateral. FCCC's sole recourse is to the issuer. Therefore, a tight credit screen is applied to check issuers' eligibility, and this is reviewed about every six months. Initially, FCCC receives an irrevocable payment promise from the issuer. If the issuer asks for a larger amount of credit, the decisions must be made outside of FCCC which has no authority to make credit decisions itself.

Payments from the issuer at maturity may occur in any of three ways depending on FCCC's perception of the risks involved. With a high degree of risk, FCCC will require the issuer to pay the funds the day before settlement. The funds will be invested overnight and will be available the next day. In the second case, FCCC relies on the part of the letter of terms and conditions requiring the issuer to pay funds to FCI before 10:00 am in New York. FCCC can check by itself whether the funds have come in before releasing the payments to holders of the ECP. Finally, in cases where FCCC is totally comfortable with the creditworthiness of the issuer, the funds are paid immediately over CHIPS. Reflecting the relatively high credit quality of the borrowers, about 90 percent of FCCC's business falls into the last category. In all cases, FCCC has recourse to the issuer under the terms and conditions of the basic credit agreement.

Physical Deliveries

In the case of Euro-commercial issues with paper held outside of FCCC, the information on maturity would, as mentioned earlier, be generated daily. The computer listing is checked against the paper

DIAGRAM 6:
Issuance of Eurocommercial Paper Using Euroclear

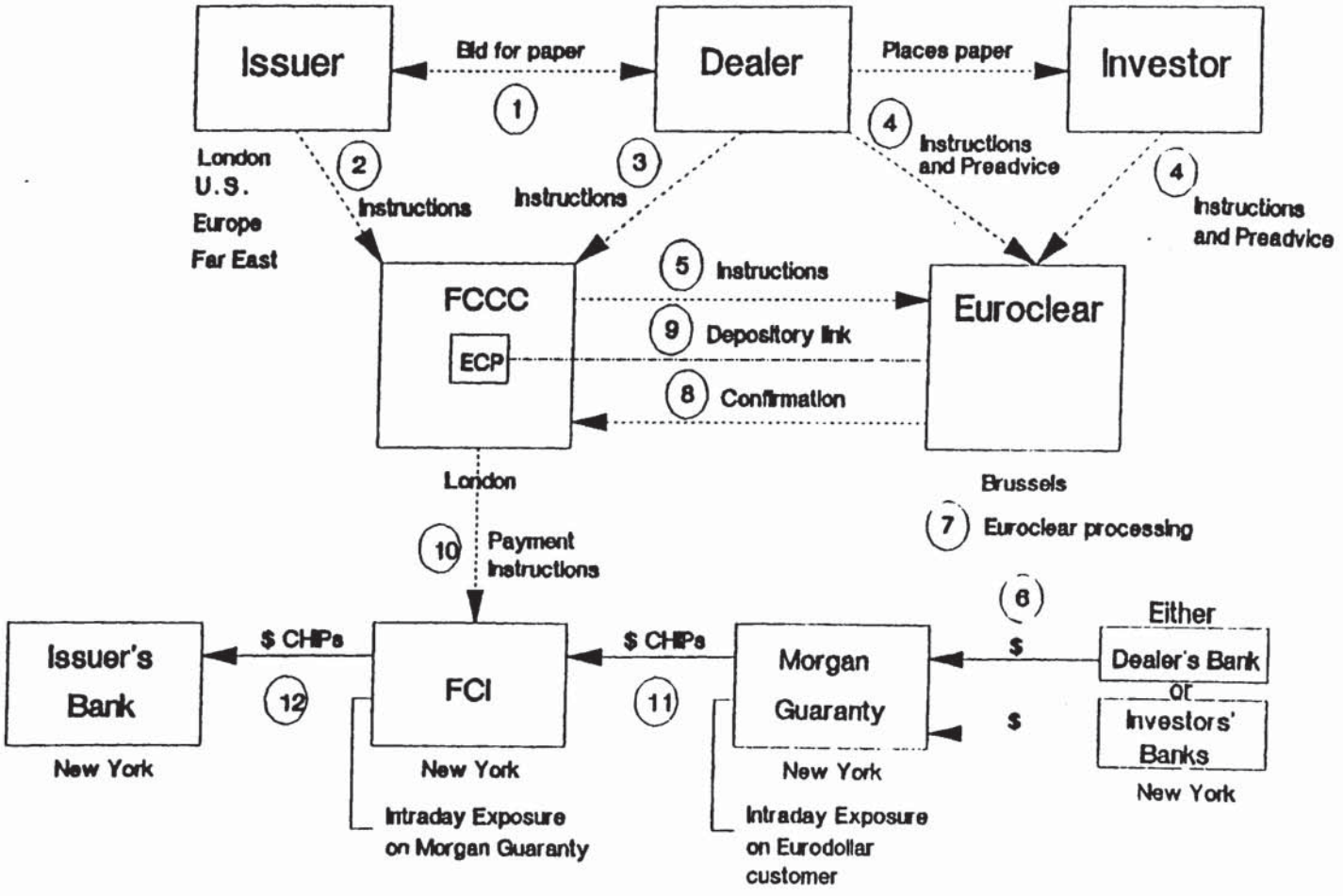


DIAGRAM 6:
Issuance of Eurocommercial Paper Using Euroclear

(Continued)

(1) Trade date T.

(2) Instructions to FCCC from issuer on day before issuance T + 1.

(3) Dealer's instructions to FCCC from dealer to be matched with issuer's instructions.

(4) Dealer's instructions to Euroclear on T + 1 for distribution of ECP.

(5) FCCC instructions to Euroclear on payments and depository arrangements.

(6) Either the dealer's bank and investor position funds or arrange pre-advice for Euroclear processing during the night of T + 1. If pre-advices are used, funds come into FCI's account as in the other cases and there could be an intraday exposure.

(7) Euroclear processing occurs on night of T + 1:

distribution of notes against payment.

(8) FCCC receives positive confirmation from Euroclear that the distribution has been completed on the morning, London time, of the settlement day.

(9) This represents FCCC's depository function for Euroclear. FCCC holds the physical paper for Euroclear.

(10) FCCC instructs FCI to pay proceeds to the issuer.

(11) Morgan Guaranty pays FCI through CHIPs according to earlier instructions. Timing depends on MG's overall liquidity management.

(12) FCI pays issuer's bank the funds through CHIPs. Timing depends on FCI's overall liquidity management.

physically held in FCCC's vaults. Paper held outside of FCCC can be presented to FCCC as late as 5:00 pm London time. Once the entire presentation is complete and verified, FCCC sends payment instructions to FCI to pay the investors' banks (Item 4 in diagram 7 on page 47). The payment from FCI to the investors (item 5) will usually occur after the covering payment is received from the issuer's bank, who is obligated to pay FCCC by 10:00 A.M. New York time. As mentioned earlier, FCCC can have the issuer preposition funds on the day before or it can hold off the release of funds until the issuer has paid in to FCI New York. FCCC can monitor real-time its account at FCI in New York. In any case, FCCC is covered by an irrevocable payment promise from the issuer.

Book-entry: FCCC

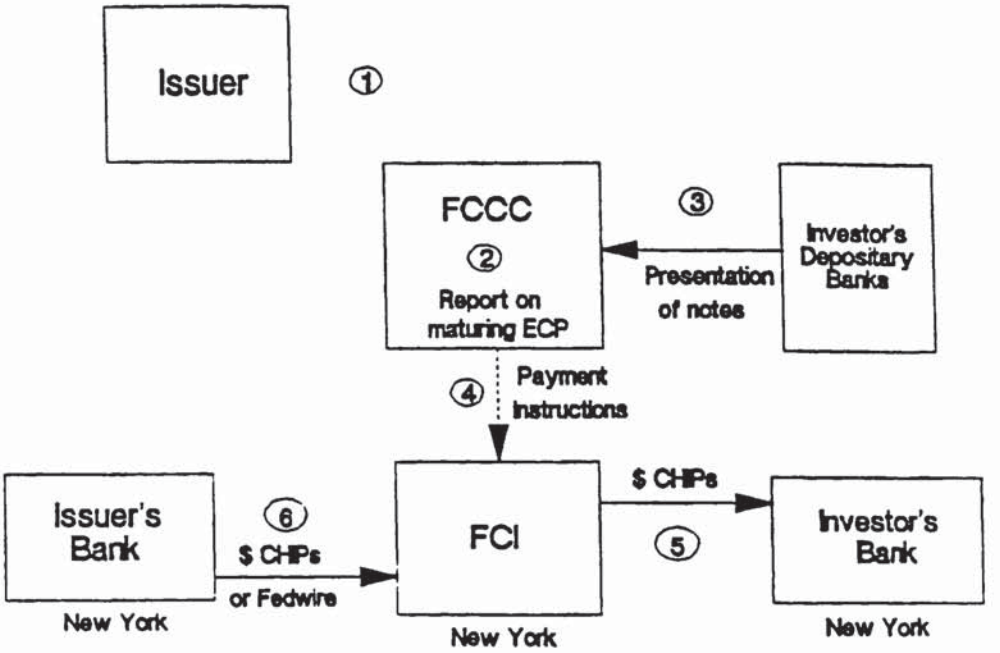
When the maturing Euro-commercial paper is held entirely within FCCC's book-entry system, the handling of the redemption is essentially the same as in the previous example, except that there are no physical presentations. FCCC has all of the paper and information and need not wait for paper held outside. Diagram 8 on page 49 illustrates the process. The risk profile is the same as in the previous case.

Book-entry: Euro-clear

Processing for ECP held for Euro-clear differs from the previous example because of the timing of Euro-clear's operations. FCCC will send instructions to Euro-clear on the day before settlement, as seen in diagram 9 on page 50-51. FCCC sends a facsimile of its own records of the maturing ECP to Euro-clear before the end of the day before settlement in London. As in the earlier examples, FCCC brings up the physical ECP on settlement date and checks these against its records. The paper is presented to the paying agent, in this example First Chicago. The paying agent confirms that it will pay Euro-clear on settlement day the agreed upon

DIAGRAM 7:
Maturing Eurocommercial Paper

Physical Deliveries



① In most cases, there is no communication with the issuer just before the settlement date, unless a pre-payment of funds is called for, which is rare.

② FCCC's system generates information on maturities, maturing issues and holders in FCCC. The paper held inside FCCC is received and matched against the list.

③ Investors' banks holding ECP outside of FCCC have until 5 PM London time to present it.

④ Payment instructions are sent to FCI NY in the afternoon, London time.

⑤ Issuer's bank pays dollars over CHIPs or Fedwire to FCI. Issuer undertakes to pay FCI by 10 A.M. New York time.

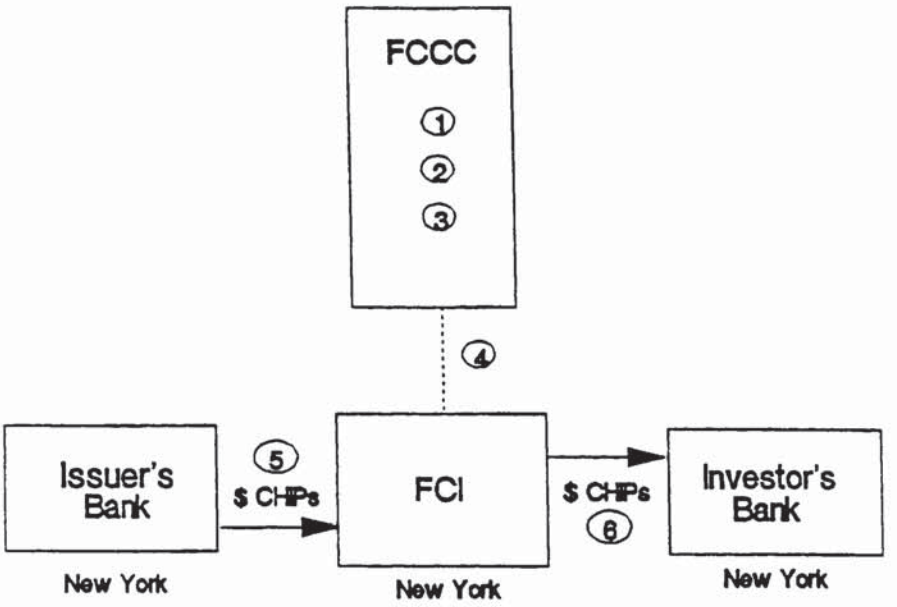
FCCC is covered by an irrevocable payment promise from the issuer.

⑥ FCI pays investors' banks over CHIPs in the early afternoon, New York time.

amount of dollars in New York. That same day a payment order is sent by FCCC to FCI in New York along with other instructions to pay Morgan Guaranty for account of Euro-clear. The issuer is obligated by agreement to pay FCI by 10:00 A.M. New York time. Normally, FCI will have received funds before paying Euro-clear over CHIPS. If an intraday exposure of FCCC to the issuer does occur, it is covered by an irrevocable payment promise from the issuer.

DIAGRAM 8:
Maturing Eurocommercial Paper

Book-entry in FCCC



(1) FCCC's computer generates daily reports on maturing ECP. On settlement day, the information on the maturing ECP held in book-entry form is generated.

(2) FCCC uses this report to bring up the physical securities and check them against its records.

(3) FCCC presents the securities to the paying agent. If First Chicago is the paying agent, then this is an internal presentation.

(4) Payment instructions are sent to FCI in New York to pay the holders of the maturing ECP so according to FCCC's report and their instructions.

(5) Issuer pays FCI. If FCI is IPA, payment is usually due for 10:00 A.M. New York time. First Chicago is covered by an irrevocable payment promise from the issuer.

(6) Payments made over CHIPs to the banks of the investors from FCI. Usually after funds have been received.

DIAGRAM 9:
Maturing Eurocommercial Paper
Using Euroclear

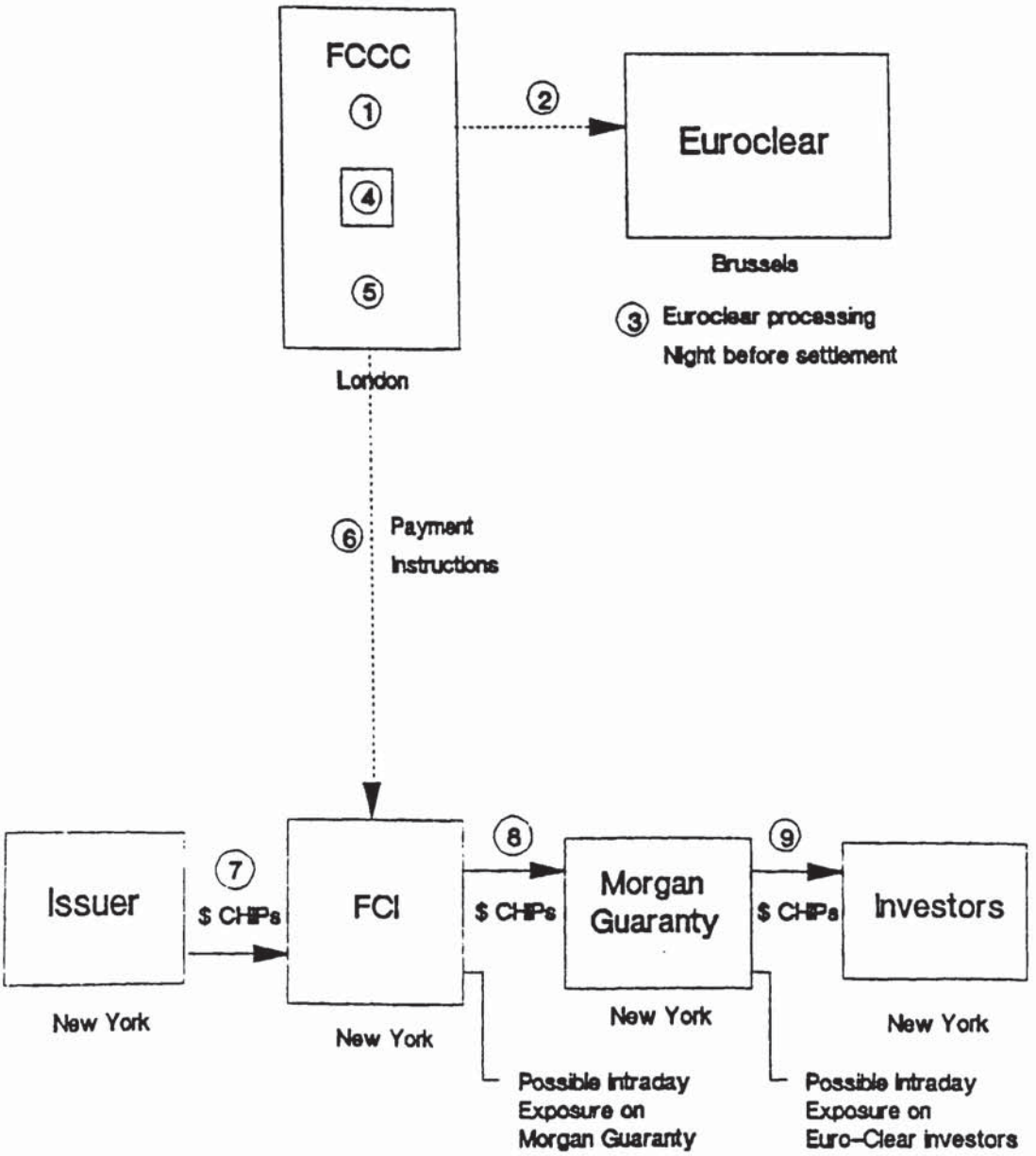


DIAGRAM 9:
Maturing Eurocommercial Paper in Euroclear with First Chicago as Issuing and Paying Agent

(Continued)

(1) FCCC's computer generates daily reports on maturing ECP.

(2) FCCC advises Euro-clear on the day before settlement by facsimile of the details of the paper and payments.

(3) Euro-clear processes securities during the night. This generates payments of dollar proceeds to investors.

(4) FCCC brings up the ECP on the settlement day and checks it against internally produced reports.

(5) The paper is presented to the paying agent (in this example, First Chicago) and the paying agent confirms that it will pay Euro-clear on the settlement day.

(6) Payment order is sent by FCCC to FCI along with other payment orders on the settlement day to pay Morgan Guaranty for the account of Euro-clear.

(7) Issuer pays FCI over CHIPs on settlement day as per terms and conditions of agreement between the issuer and First Chicago.

(8) FCI pays Euro-clear over CHIPs on the settlement day.

(9) Holders of maturing ECP have funds available to cover payment at the open of the New York day (possible intraday exposure of Euro-clear if funds are paid before FCI pays in).

Exchanges and Clearinghouses For Financial Futures and Options In The United Kingdom

PREFACE

The year 1988, during which this paper was written, witnessed dramatic changes in the structure of the futures and options markets in London. A new regulatory regime, a product of the Financial Services Act of 1986, went into force in stages, with the major provisions taking effect in April 1988. In conjunction with this, new rulebooks were written, procedures manuals were revised, and ICCH and ISE were restructured. Concurrently, new computer systems were installed at LIFFE, which brought further changes to operations. In the second half of 1988, ICCH was restructured a second time; LIFFE was also restructured. Also, a rapprochement between the rivals LIFFE and LTOM led a reduction in the areas where they fielded competing products. All these changes--regulatory, technological, and structural--are continuing.

Against this background, the present paper does not pretend to depict the most recent state of affairs. Nonetheless, it is hoped that the bulk of the contents of this paper will remain valid for a while longer.

ACKNOWLEDGEMENTS

Many people at LIFFE, ICCH, and the International Stock Exchange have generously provided information for this study and made themselves available for substantial discussions. Ms. Jill Evans of LIFFE, Mr. Kenneth Williams of ICCH, Mr. Vincent Mercer of ISE, and Ms. Sara Williams of LOCH have been particularly helpful and provided comments on an earlier draft of the paper. Nonetheless, they are not to be held responsible for any remaining errors.

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Exchanges and Clearinghouses for Financial Futures and Options in the United Kingdom

London is the scene for a rapidly growing market in financial futures and options and the anchor of the European time zone in around-the-clock trading. Propelled in part by the "Big Bang," the volume of trading on the London International Financial Futures Exchange (LIFFE) doubled in both 1986 and 1987 and then grew another 15 percent in 1988, reaching 15.5 million contracts. The value of the securities or commodities underlying the LIFFE contracts being traded averaged approximately $23 billion per day.[1] An additional 1.2 million financial options contracts (not counting options on equities) were traded on the International Stock Exchange (ISE), with a daily average value for the underlying of $120 million. This paper reviews the structure of British markets and operations for financial futures and options.

The first section briefly surveys the historical development of the marketplace. The second section expounds the institutional structure of the exchanges, clearinghouses, and regulators. The characteristics of futures and options presently traded are detailed in the third section. Trading mechanisms are

---

[1] Eurodollar and sterling short-term interest-rate contracts accounted for $19 billion (83 percent) of the average daily underlying, albeit only 37 percent of the number contracts traded.

reviewed in the fourth section. The final three sections describe the clearinghouse operations.

I. Development of the Market

LIFFE was organized in 1981 as a marketplace for the trading of financial futures. The fledgling exchange contracted with International Commodities Clearing House (ICCH, founded in 1888) for clearing services. When trading started in September 1982, the first contracts were futures based on the three-month Eurodollar interest rate and the sterling/dollar exchange rate. (These futures were already being traded on Chicago Mercantile Exchange's International Monetary Market [IMM].) Three more currency contracts, one on the three-month sterling interest rate, and one on long gilts were launched before the year was out. In mid-1984 LIFFE added the U.S. Treasury bond futures contract, modelled on that traded on the Chicago Board of Trade (CBOT). A near-copy of the Japanese government bond futures contract was added in 1987; one on German government bonds (bunds) began trading in September 1988.

ISE introduced the first British financial option, that based on a stock index, in May 1984. (ISE had been trading options on equities since 1978.) This exchange followed in 1985 with the first U.K. options based on gilts and on currencies. Its options on British sterling and Deutsche marks were based on those already trading on the Philadelphia Stock Exchange in the U.S. Subse-

quently, LIFFE introduced its own options, all distinctly different from those on ISE. ISE dropped its gilt options in 1988. As of year-end 1988, a total of 14 futures and 6 options contracts were being traded on LIFFE, while 3 options (excluding those on equities) were traded on ISE (Exhibit I):

Futures-LIFFE	Volume in 1988
3 month Eurodollar interest	1,647,507
3 month sterling interest	3,537,950
Long gilt	5,586,753
Medium gilt	54,108
Short gilt	--
U.S. Treasury bond	2,042,316
German bund	315,224
Japanese government bond	121,630
Sterling/dollar	7,320
Deutschmark/dollar	4,073
Dollar/mark	41
Swiss franc/dollar	2,650
Yen/dollar	2,509
FT-SE 100 index	465,103
Options-LIFFE	
3 month Eurodollar interest	76,191
3 month sterling interest	444,785
Long gilt	1,141,203
U.S. Treasury bond	84,378
Sterling/dollar	9,728
Dollar/mark	1,706
Options-ISE	
Sterling/dollar	6,595
Deutschmark/dollar	228
FT-SE 100 index	1,175,192

Source: International Financing Review, no. 757 (January 7, 1989), p. 83; LIFFE; ISE.

As can be seen in the table above, the long gilt future was LIFFE's most heavily traded contract in 1988, accounting for over one-third of LIFFE's total volume. It accounted for over half of volume in 1987. This contract was not always so dominant; until the Big Bang, the Eurodollar contract was by far LIFFE's most heavily traded futures. When the number of gilt market-makers on ISE was expanded from 2 to 27 in the Big Bang of October 1986, trading in gilt futures took off. The short sterling, U.S. Treasury bond and Eurodollar futures contracts were the next most frequently traded in 1988. Still, LIFFE's volumes of trading in 1988 were small compared to the 70.3 million U.S. Treasury bond contracts traded on the CBOT and the 21.7 million Eurodollar futures traded on the IMM.

Both LIFFE and ISE fare poorly when the volume of trading in their currency contracts is compared to that on American exchanges. In 1988 LIFFE's 16,593 currency futures traded paled besides the 20 million contracts (for the same currencies) traded on the IMM. The comparisons in currency options between London and Chicago or Philadelphia are just as unfavorable, even adjusting for units of trading. Much of the difference between the two sides of the Atlantic Ocean reflects the relatively stronger interbank, over-the-counter (OTC) market for currency options in the United Kingdom. For example, one of the major British participants in

currency options reported that its business on LIFFE amounted to only three or four percent of its involvement in the OTC market.[2]

In 1986 LIFFE established a link with the Sydney Futures Exchange for the trading of the U.S. Treasury bond and Eurodollar futures. This link attempts to counter similar links between CBOT and the Singapore International Monetary Exchange (SIMEX) (for the U.S. Treasury bond contract) and between IMM and SIMEX (for the Eurodollar contract). (See Section II for further discussion of linkages involving the London exchanges.)

Seeking entry into the OTC market, ISE introduced negotiated (ad hoc) options on gilts in October 1987. These allow investors, primarily professionals, to tailor terms to offset a specific exposure.

LIFFE and the options trading division of ISE have occasionally been reported to be undertaking merger talks. Each group reportedly sought to acquire the other, a prospect the other would reject. For the time being, a more cooperative attitude prevails. In August 1987 the two exchanges announced an agreement to develop jointly new systems, procedures and products.[3] The cooperation is expected to lower investment costs for both

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[2] International Financing Review, no. 604 (January 11, 1986), p. 131. There is also an OTC market in gilt options, mainly used by gilt-edged market-makers.

[3] Clive Wolman, "Stock Market and LIFFE Merger Talks End in Deadlock," Financial Times (August 7, 1987); International Financing Review, no. 685 (August 8, 1987), pp. 2635-8.

exchanges and to improve operating efficiencies for their members, in terms of reducing both paperwork and capital requirements. In the area of systems, LIFFE brings to the joint effort special expertise in developing systems for matching trades, while ISE brings special technical competence in order routing and small order execution. Price reporting procedures on both exchanges were to be reviewed and a joint system devised. The development of a common scheme of guaranteeing contracts would facilitate cross-margining between positions on each exchange. (This would also entail a rapprochement between their respective clearing houses.) Finally, in product development the two exchanges could eliminate wasteful competition, duplication and overlap between the contracts offered. Soon enough, the following month ISE announced that it would drop its options on gilts, while LIFFE eliminated an option on stock index futures.

II. Institutional Structure

Both futures and options are traded on LIFFE, as noted above. Options on ISE are traded in its London Traded Options Market (LTOM) division. LIFFE is served by an independent clearinghouse, International Commodities Clearing House (ICCH). LTOM's options contracts, other than those on currencies, are cleared by an ISE subsidiary, London Options Clearing House (LOCH). LTOM's currency options are cleared by ICCH, with LOCH acting as ICCH's agent.

LIFFE

LIFFE was incorporated in 1981 to create a market for financial futures and to carry on ancillary business.[4] This market opened one year later. In 1985 it established a subsidiary, LIFFE Options plc, as a marketplace for financial options.[5]

Governing Structure

LIFFE is governed by a Board of Directors presently comprised of 19 individuals. Eighteen of the directors were elected by the membership from among their number and one is the chief executive of the exchange, appointed by the Board.[6] The directors (other than ex-officio executive directors) serve for three-year terms.[7] The Board has a chairman and a deputy chairman, each of whom is elected for a one-year term. Mr. A. David Burton was elected chairman in 1988, replacing Mr. R. Brian Williamson, who had served three terms. Mr. Michael N.H. Jenkins has been LIFFE's chief executive since its founding in 1981.

---

[4] Memorandum of Association of The London International Financial Futures Exchange Limited (September 28, 1981), Section 3.

[5] Options are traded in a subsidiary in order to avoid value added tax (VAT) on the sale of options seats. LIFFE is presently attempting to put futures and options seatholders on a par by reorganizing as a holding company.

[6] Eighteen is the maximum number of elected directors allowed by the Articles of Association of The London International Financial Futures Exchange (adopted September 28, 1981, and amended in 1982 and 1984), Article 12.02. Hereafter cited as "LIFFE Articles."

[7] LIFFE Article 17.03A.

The Board has power to establish the conditions of exchange contracts.[8] It can also adopt resolutions governing the exchange provided that they are not opposed by at least either ten members or the holders of 50 seats. All other resolutions are adopted or amended by the general membership.

The Board may delegate its powers to committees. A Membership and Rules Committee appears to have wide scope in running the exchange. There are a Floor Committee and various Pit Committees. Additional committees, known as panels, are appointed by the chairman or deputy chairman of the Membership and Rules Committee on an ad hoc basis to investigate violations of the exchange's rules.[9]

Disciplinary actions may be handled by either a Consent Review Panel or a Disciplinary Panel. Each consists of three members; the panels have the same powers. The difference between them is that if an accused member or his employee agrees to the investigation, it may proceed informally in a Consent Review Panel. If the accused does not agree, a Disciplinary Panel is assembled. Also, the findings and sanctions (if any) of the Consent Review Panel must be accepted by the accused member; otherwise they are automatically voided and a Disciplinary Panel is appointed. The

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[8] LIFFE Article 20.02(b) in conjunction with Article 20.03(a).

[9] LIFFE Rule 5.2.2.

accused at a hearing of the Disciplinary Panel is entitled to legal counsel. The decisions of this panel may be appealed to the full Board of Directors. The decisions of the Board are final.

Disputes between members over particular contracts, as opposed to alleged violations of trading rules, are subject to arbitration.[10] The results of the arbitration are subject to subsequent litigation.[11]

In circumstances calling for emergency action, the Board may take "any steps whatsoever...to preserve or restore conditions enabling the orderly conduct of business and the due performance of contracts."[12] Such situations include war, the imposition of government controls, excessive trading positions, unwarranted speculation, "or any other undesirable situation or practice."[13] If practicable, the Board shall consult a Market Advisory Committee, whose purpose is to advise the Board in emergency situations. This committee includes at least one representative of ICCH.

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[10] LIFFE Rule 6.1.

[11] LIFFE Rule 6.5.

[12] LIFFE Rule 4.17.1.

[13] LIFFE Rule 4.17.2.

LIFFE Options plc has its own Board of Directors, comprised of five directors who are also directors of LIFFE.

Membership

Membership in LIFFE is open to individuals and a wide range of institutions: banks, discount houses, investment or merchant banks, and stock and commodities commissions houses (brokers). Even specialists on the ISE ("jobbers" in British lingo) may be members of LIFFE.[14] Hence, it is not necessary for traders, such as banks, to go through brokers in order to transact business in a trading pit.

Every member must own at least one seat, which entitles him or a person nominated by him ("the seatholder") to trade in the pits.[15] (This requirement was relaxed in July 1988--see below.) In addition to owning a seat, all members must meet three criteria:

- a sound business reputation
- its traders have sufficient relevant experience
- a minimum tangible net worth

The minimum net worth is £100,000 for members dealing with the public or £25,000 for members trading for their own account or as a broker on behalf of other members. Entities that wish to undertake clearing must exhibit net worth of £500,000 (if they

---

[14] ISE rules limit specialists to dealing with other members, even on LIFFE.

[15] LIFFE Article 2.04 and Rule 3.14.1. A member may lease out all its seats and thus have no right to trade. Such a member retains voting rights. It cannot clear trades.

intend to clear only for themselves) or £1 million (if they wish to clear for other members, becoming "general clearing members"), and also meet other requirements which the clearinghouse imposes (see below). In addition, a firm may lease a seat from a member and become an "associate member." Associate members must meet the same criteria as apply to members. They may not clear or serve the public, however.

Applicants for membership must provide appropriate documentation.[16] In addition, if they do not intend to become clearing members, they must obtain the agreement of a general clearing member to clear their trades.[17] Subordinated loans and guarantees from a parent company, clearing firm, or another source are acceptable for meeting half of the net worth requirements.

Once admitted to membership, members must indicate once a quarter that they remain in compliance with LIFFE's rules. This indication may take the form of submitting to LIFFE's Market Supervision Department either (a) a balance sheet (permittedly with liabilities adjusted so as to disguise profits) or (b) a

---

[16] This includes a minimum of three references, the latest financial information, the names of the applicant's auditors and legal counsel, a brief description of its intended role on the exchange, and any other information about the firm and its traders that would be relevant.

[17] If the agreement with a general clearing member lapses, the non-clearing member cannot trade as a member, but only as another member's client.

declaration that he is in compliance.[18] Either way, members must submit an annual report. Members must also either make their financial records available for inspection by officials of the Market Supervision Department or (if the member prefers) by his own outside auditors. Such inspections may be conducted without advance notice. In addition, the Market Supervision Department may inspect records to ascertain open trading positions or to determine whether conditions exist to restrict or suspend trading.[19]

All members are required to notify the Market Supervision Department (and, if they are clearing members, ICCH) immediately if they have reason to believe that they do not or may not comply with the exchange's financial requirements.[20]

Members and non-members of LIFFE may purchase a "B" share in LIFFE Options plc.[21] Ownership of a share entitles the member

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[18] LIFFE Rule 3.21.1. The declaration must be backed by an auditor's opinion, although the Market Supervision Department may waive this requirement in alternate quarters. Individual members need not submit quarterly or annual statements if they satisfy the net worth requirements by offering a guarantee acceptable to the exchange.

[19] LIFFE Rule 3.20.

[20] LIFFE Rule 3.21.2.

[21] Nonmembers were allowed to be shareholders since January 20, 1987. Previously, only members could be shareholders. The change was made to reduce the cost of entry into options trading. At the time of the change, a seat cost £100,000, while a share cost £50,000. (The price of a futures seat subsequently rose to £245,000 as of December 1987.)

to obtain a permit to trade options in the pits.[22] Such permits are granted to parties that meet stated criteria--a suitable business standing, experience, the passing of examinations by proposed floor traders, and minimum net worth requirements.[23] Permits, like seats, may be leased to other parties. Clearing arrangements parallel those in futures. Unlike the case of futures, however, it is not necessary for a member to have a trading permit in order to clear options trades.

(Although the "B" shares carry voting rights, LIFFE owns a single "A" share that has more voting power than all the "B" shares combined.)

In July 1988 LIFFE undertook to raise additional capital by creating a new subsidiary, LIFFE Futures plc. Purchase of a share (labeled "C" shares) in this subsidiary gives the shareholder the right to trade all contracts except the most actively traded long gilt, U.S. Treasury bond, Eurodollar, and short sterling interest-rate contracts. As each "C" share will cost £10,000, far less than the £220,000 cost of a full seat, the issue is designed to attract additional locals and individual traders to the trading floor. After September 1, 1990, the holder

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[22] Whereas, in futures, ownership of a seat is a prerequisite to becoming a member of LIFFE, in options one may be shareholder without necessarily obtaining a permit to trade. (In fact, the number of shares exceeds the number of shareholders. This suggests that some shareholders purchased extra shares as an investment.)

[23] The net worth requirements are the same as those for owners of futures trading seats.

of four "C" shares can convert these shares into one full seat on LIFFE itself.

As of January 1988, LIFFE reported 179 members holding 373 seats. An additional ten firms held associate membership status. It also reported 110 shareholders of its options subsidiary, of which 107 were also futures members, one was an associate member, and two were nonmembers. Approximately 60-65 of the members are locals, trading for their own account. Nearly half of the members are based outside the United Kingdom. Approximately a third of all members are banks (with equal numbers of U.K. and foreign institutions). The membership list includes approximately 30 U.S. commercial and investment banks and approximately 30 Japanese institutions.

While the exchange and clearinghouse impose fees on every trade, these fees are not particularly significant for members.[24] More important for the members' profitability is the efficiency of the exchange and the liquidity of the contracts.

Financial Condition

LIFFE appears to be in sound financial condition. Equity of £8.4 million supported 70 percent of assets as of December 31, 1987 (Exhibit II). Cash and deposits comprised 50 percent of assets.

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[24] "International Survey," International Financing Review, no. 634 (August 9, 1986), pp. 2381-2.

The equity base was comprised of £9.1 million from the sale of futures trading seats and £1.3 million from the sale of shares in LIFFE Options plc, less cumulative deficits of £1.9 million that remained from losses during the exchange's start-up years. In 1987 the futures business was profitable, adding £1.9 million to capital (vs. profit of £550 thousand in the 15 month period ended in December 1986). The options business produced a loss of £133 thousand, less than the prior-period's loss of £609 thousand. Consolidated profits in 1987 thus were £1.8 million on revenues of £12.6 million. Most of the revenues came from membership subscriptions, futures seat and options trading permit fees, and rentals of equipment to traders.

As noted earlier, LIFFE hopes to raise additional funds from the offering of a new class of "C" shares. These funds will be used to increase the exchange's trading capability, to further develop a new Trade Processing System for clearing trades, and to develop an automated trading system for trading outside the normal trading hours.[25]

ICCH

The International Commodities Clearing House Ltd. clears futures and options contracts on financial instruments, metals, and soft goods for eleven exchanges around the world, including six in

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[25] International Financing Review, no. 734 (July 23, 1988), p. 2429.

London.[26] Most of this clearing is done in ICCH proper. In some cases, specifically LTOM and certain foreign exchanges, ICCH manages partially-owned or independent clearinghouses and provides at most a portion of the guarantee of contract performance. All told, ICCH clears some 100 different contracts in nine currencies, not counting options on individual equities. Nearly a third of the contracts cleared in 1987 were traded on LIFFE.

Contracts Cleared by ICCH, 1987

Exchange	Thousands of Contracts Futures	Options	Total	Percent Total
LIFFE	12,516	1,185	13,701	31.6%
LTOM	--	11,754	11,754	27.2
Other London Exchanges	7,438	44	7,482	17.3
Overseas Exchanges	9,767	587	10,354	23.9
Total	29,721	13,570	43,291	100.0%

Source: ICCH, Market Turnover Statistics, 1888-1987.

Founded in 1888, ICCH was purchased in 1982 by six banks: Barclays Bank, Lloyds Bank, Midland Bank, National Westminster Bank, Standard Chartered Bank, and The Royal Bank of Scotland.[27]

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[26] Actually, ICCH clears all commodities traded in London except grain. Outside of London, the exchanges are INTEX (Bermuda), the Sydney Futures Exchange, the New Zealand Futures Exchange, the Hong Kong Futures Exchange, and the Malaysian Futures Exchange. (Actually, in Kuala Lumpur ICCH only manages the operations of the Malaysian Futures Clearing Corporation.)

[27] These banks, except for Standard Chartered, formed the Committee of London Clearing Bankers that was among the owners and operators of all funds payment and clearing systems in England. Previously, ICCH was owned by United Dominions Trust. When United Dominions' capital was falling while futures volume and price volatility were rising, the Bank of England arranged the present consortium of six banks to buy ICCH.

(The first four each own 20 percent; the last two own 10 percent.) As a profit-making venture, ICCH aggressively seeks new business. It participates in clearing for foreign exchanges. It sells members data-processing services for their own operations and for individual clients. Additionally, ICCH earns a spread between prevailing bank rates and the rate it pays members for their margin and unencumbered deposits. ICCH reported a consolidated profit of £3.4 million in the fiscal year ended October 31, 1987, for an annualized return of 20.1 percent on average capital and 0.6 percent on average assets. It declared dividends of virtually all of its net earnings.

Organization

ICCH underwent two restructurings, in September 1987 and October 1988, in order to separate the clearing functions from other, commercially oriented, activities. As a result of these restructurings, ICCH now consists of two main divisions, Recognised Clearing House and ICCH Financial Markets Company, in addition to six wholly-owned and three partially-owned subsidiaries (Exhibit III).

Recognised Clearing House provides all of ICCH's clearing operations for the London markets. It has three major divisions: Market Services, Finance, and Risk Management. Market Services, the "heart" of ICCH, operates the clearinghouse for various markets in London: financial, agricultural (including cocoa, coffee, meat,

potatoes, soybeans, and sugar), energy, Baltic freight, and metal (aluminum, copper, lead, nickel, silver, and zinc).[28] This is a unitary clearinghouse: its members maintain only one or two accounts (one for themselves and a segregated customers account), regardless of the number of exchanges on which they trade, and the clearinghouse has knowledge of their positions on several exchanges. (Concomitantly, problems on any of the exchanges served conceivably could spread to all other exchanges.) Finance contains the Treasury Department and operates LOCH through a subsidiary, ICCH (Stock Options) Ltd. Risk Management contains the Member Control, Regulatory, Risk Analysis, and Member Training Departments. In addition, Recognised Clearing House maintains branches in Sydney, Melbourne, and Auckland. These branches, as well as ICCH's operations in Kuala Lumpur, Malaysia, operate autonomously under a Board of Directors based in Sydney.

Contracts cleared by Recognised Clearing House are backed by a guarantee of £100 million, over and beyond ICCH's capital base of £15 million in equity plus reserves. This guarantee is provided partly by ICCH's stockholder banks and partly by insurance companies. Until the establishment of this guarantee in February 1988, ICCH had no dedicated guarantee fund; its obligations were backed only by its £15 million in equity and the moral obligation of its owners. (The clearinghouse has no right to assess members

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[28] ICCH has been clearing for the London Metal Exchange only since May 29, 1987.

for losses.) As such support was widely deemed weak in the context of the increasing volume of contracts guaranteed, the new guarantee scheme was arranged. (The £100 million backing does not cover overseas exchanges other than those in Australia and New Zealand.)

ICCH's commercial activities are located in ICCH Financial Markets Company (IFMC).[29] These activities consist of the provision of systems and services to exchanges, brokerages, and other financial institutions.

Exchanges. IFMC sells trade processing systems, distinct from those utilized by ICCH for its clearinghouse functions, to exchanges.[30]

Brokerages. IFMC provides back office processing and accounting control systems for brokers and dealers, including perhaps 50 LIFFE members. Two such systems, "CLASSIC" (used by members of LIFFE and various other exchanges) and "OSCAR" (used by LOCH members) have been in use for several years. CLASSIC (and later, OSCAR) will be replaced by a new IFMC product called "FORTE." Through a joint venture with MATIF, a futures exchange in Paris, IFMC's French subsidiary is developing a back-office system, MAETRO, for French brokerages. IFMC will also provide clients with equivalent services using its own computers.

Other financial institutions. IFMC develops market systems for and provides management services to capital markets in the United Kingdom and overseas. For example, IFMC developed the Automatic Trading System (ATS) used by the New Zealand Futures Exchange and the Irish Futures and Options Exchange. IFMC participates with SWIFT in a joint venture, ACCORD. The company was also responsible for the development of the now-defunct London-Clear, a planned clearing and settlement mechanism for monetary instruments for the London clearing banks.

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[29] ICCH Financial Markets is not the same thing as a unit by the same name that existed prior to the reorganization of October 1988. The services provided by the defunct ICCH Financial Markets–plus other services–are presently provided within the new company, however.

[30] LIFFE's Trade Registration System, to be described later, is not among these systems; it was developed in-house by LIFFE itself.

ICCH is governed by a Board of Directors consisting of 16 members, including its chairman, a representative from each of the six owner banks, and nine executives. Mr. R.R. St. John Barkshire has been chairman since 1986; formerly, he was the chairman of LIFFE 1982 to 1985. The highest ranking executive is Mr. J. Martin Eades, Group Managing Director, who succeeded Mr. Ian W.T. McGaw in February 1989.

Each of the major divisions of ICCH has its own board of directors. The Board of Recognised Clearing House consists of eleven people: Mr. Eades (Chairman), Managing Director David Hardy, the directors of its three major units, and six outside directors representing the exchanges and members. The Board of IFMC consists of seven individuals: Mr. Eades, Mr. Hardy, and five other executives.

Members

The clearinghouse reported 500 clearing members as of January 1, 1988, including 263 headquartered in London, 138 in Australia,[31] 25 in New Zealand, 18 in the U.S., and 1 in Japan.[32] Members are required to have a minimum tangible net worth of

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[31] To the extent that the Australian members are members of the Sydney Futures Exchange, most are unlikely to be eligible to trade on the exchange floor. Only 29 ICCH members are allowed to trade on the floor; the rest may be associate members of the exchange, who must execute their trades through a floor member.

[32] The clearing business is fairly concentrated. In 1986, 83 percent of all trades cleared by ICCH passed through 47 clearing members, of which fewer than 20 were active in LIFFE. "ICCH Bears Up to a Changing Environment," International Financing Review, no. 643 (October 11, 1986), p. 3070.

between £150,000 and £1 million, depending on the size of their clearing business. At least half of the net worth requirement (with a minimum of £100,000) must be in the form of permanent, paid-in equity; the rest may consist any type of equity (including retained earnings and reserves) or even, at ICCH's discretion and with the approval of the relevant self-regulatory organization, of subordinated loans or guarantees. Further, the exchanges stipulate that firms clearing their contracts must also be members of the relevant exchange.

For members intending to clear LIFFE trades, the minimum net worth requirements are either £500,000 or £1 million, depending on whether the member also clears trades of other members. In deciding whether to admit an applicant to membership, ICCH will consider whether the candidate has the financial ability to respond rapidly to margin calls, the efficiency of its back office operation, and the integrity and general reputation of its management. If the firm's volume of business warrants, higher capital requirements than the minimum may be imposed. In particular, concerning those members that intend to clear for non-clearing members of LIFFE, ICCH has to be satisfied that their responsibilities "are not excessive in relation to their financial and other circumstances."[33] Once admitted, all members are required

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[33] ICCH, Clearing for the London International Financial Futures Exchange (October 1988), Procedure 1.4.2. Hereafter cited as "ICCH Procedures."

to submit audited annual reports, quarterly statements, and other financial information as may be requested from time to time and to inform the clearinghouse immediately of any material change of ownership, constitution, management or financial status.

Financial Condition

ICCH's balance sheet is driven by the collateral which clearing members must post daily with the clearinghouse as cover for contingent liabilities. This collateral typically supports 85-95 percent of assets. (It appears as a liability under the heading "customers' accounts" in the balance sheet in Exhibit IV.) Most of this collateral is in cash; the rest supports receivables due upon settlement of outstanding contracts. Bank guarantees posted by members are off-balance sheet. Partly because ICCH pays interest on deposits not used as margin cover, the total amount of collateral in its possession generally exceeds that actually placed in use, as shown (pounds in millions):

	10/31/87	10/31/86
Collateral available		
Customers' accounts	£673	£316
Bank guarantees	295	100
Total available	£968	£416
Collateral in use		
Margin on open positions	£552	£179
Option premiums and other liabilities	103	16
Due to ICCH on settlement of outstanding contracts	147	68
Total in use	£802	£263

Equity, in contrast, remains between £16 million and £17 million (at least on the last six fiscal year-end dates) as essentially all of ICCH's profits are paid out as dividends to its shareholders. Because of a surge in collateral during the tumultuous month of October 1987, the capital to assets ratio at the 1987 fiscal year-end date was an atypically low 2.3 percent; normally, it is approximately 5 percent. This capital is largely invested in working capital for operations (other than margination; e.g., other accounts receivables less other current liabilities) and was never (since the present owners took control) immediately available to fund ICCH's guarantee.

ISE

The International Stock Exchange, founded in 1802, is a company that provides facilities for the trading of stocks, gilts, and options. Within ISE, options are traded in its London Traded Options Market division and cleared by its subsidiary, London Options Clearing House.[34] The vast majority (92 percent in 1987) of trading volume on LTOM involves options on individual equities; we shall not discuss these.

Governing Structure

ISE is governed by a Council composed of at least 30 members (there were 33 members as of May 1988) plus a government

[34] ISE also operates the Central Gilt Office, a book entry service, jointly with the Bank of England.

broker.[35] The members of the Council serve for terms of three years and may include a limited number of lay members approved by the Governor of the Bank of England. (There were three lay members in May 1988.) The Council appoints its chairman and two deputy chairmen, all of whom serve for terms of one year. Meetings of the Council can be called by the chairman, a deputy chairman, or any three members. Authority derives from the Deed of Settlement, which constitutes ISE's constitutional by-laws. The present Deed of Settlement was adopted on November 12, 1986, to replace one in force since 1802.

The Council has at least twenty committees. The Options Committee has supervisory responsibility for trading on LTOM and for LOCH. Lesser violations of trading rules are handled by a Floor Committee, comprised of three exchange members plus the options floor manager or his deputy. Other committees handle membership and discipline; there is also a separate appeals committee corresponding to each of these.

Although LOCH is a subsidiary of ISE, it does not have any governing structure or rules and regulations separate from those for ISE as a whole. (It does have a procedures manual, however.)

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[35] Rule 1(1) of Rules and Regulations of The Stock Exchange (as amended through 1983). Hereafter cited as "ISE Rules." Clause 19 of the Deed of Settlement (as altered through November 12, 1986) requires only that the Council have at least 20 members in addition to the chief executive and the government broker. The government broker has no vote. ISE Rule 9.

The Council reserves for itself the right to "dispense with the strict enforcement of any of the Rules and Regulations."[36]

Mr. A. Hugh Smith is the chairman of ISE. He replaced Sir Nicholas Goodison in October 1988; Sir Nickolas had been chairman since 1976. Day-to-day administrative responsibility for ISE rests with ISE's Chief Executive, Mr. Jeffrey R. Knight. Mr. Geoffrey Chamberlain is chairman of the Options Committee. The ranking executive over traded options is Mr. Anthony P. de Guingand. Ms. Sara Williams is the manager of LOCH.

Members

Both individuals and firms (partnerships and corporations) may be members of ISE. At one time, all members could vote and hold ownership shares in the exchange. The new Deed of Settlement adopted in November 1986, however, provided that only firms could vote at membership meetings and, eventually, would be the only shareholders; the shares of individual members would be redeemed upon their retirement. As of March 24, 1988, there were 358 member firms with voting rights, 150 external members (mostly firms) with no voting rights, and 5,297 individual members.[37] Many members are subsidiaries of banks.

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[36] ISE Rule 20.

[37] On April 29, 1988, the category, External Membership, was abolished as a distinct category in order to conform with new regulations that went into effect on that date.

Individual and firm members must be associated with one another. Individual members must be proposed and seconded by the top management of their employers, be at least 21 years old, have three years' experience or the equivalent, and pass an examination.[38] They may register a company as corporate members. From a trading perspective, members are either market-makers or "public order members," who simply broker orders and do not make markets. Any market-maker, however, can leave the floor and return as a broker. (In order to avoid conflicts of interest, members may not simultaneously act as market-makers and brokers.[39]) All member firms, both brokers and market-makers, are eligible to clear trades.[40] Further, any member firm may form a trading subsidiary which becomes a member firm of the exchange, distinct from its parent.[41]

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[38] ISE Rule 31.

[39] ISE Rules 56(1)(a) and 71(1)(a). Brokers may be dealers. ISE Rule 92f(1).

[40] ISE Rule 92e(1).

[41] ISE Rule 72(3)(a)(i).

All regular members of ISE may apply to trade on LTOM.[42] With one exception, these are all corporations or partnerships. In early 1987 LTOM admitted individuals, called "sole traders," to its trading pits. Consistent with the restrictions on member firms, sole traders (and all firms with only one executive director) must choose between acting as market-makers and as brokers; they cannot do both.[43] If a sole trader chooses to be a market-maker, he must establish a clearing relationship with a clearing member, who assumes full responsibility for the trader's financial performance. If he chooses to be a broker, he must establish an arrangement with a member firm, who will take responsibility for the trader's trades. Also, traders acting as agents, unlike member firms, cannot deal for their own account. Thus, whichever role they choose, sole traders are restricted to dealing with and for ISE members.[44] As of October 1988, there was just one sole trader, who acted as a market-maker.

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[42] Concurrent with the start of trading in currency options in May 1985, ISE created a Restricted Currency Options Member category in order to attract banks, money brokers, and options dealers, who would not be interested in trading if subject to the full costs of regular ISE membership. However, there presently are no such members.

[43] In London the sole traders are called "locals," in reference to locals in the U.S. There appears to be a misunderstanding of the U.S. system and a confusion in terms, because U.S. locals, by definition, deal for their own account and not for clients.

[44] In contrast, LIFFE makes no distinction between its individual and corporate members.

Market-makers have several privileges not necessarily accorded other members. They pay lower clearing fees. Securities held to hedge option positions are not subject to stamp duty. They may have direct telephone lines in the trading pits. The ISE accords them stock borrowing facilities. In return, they must make markets in at least one contract of each series of options in which they are registered and meet minimum volume standards (see Section IV below).

All member firms and sole traders are subject to financial supervision by ISE's Surveillance Department. Among other things, member firms must meet minimum liquidity (or capital) requirements as established by the exchange. These requirements are stated amounts related to the size of the positions carried by the firm and the identity of its customers. For options dealers, minimum capital shall be at least £15,000.[45]

Clearing Members

LOCH has two levels of membership: clearing member and clearing agent. The former clear for themselves, while the latter also clear for other members. The clearing activity of clearing agents must be separated from the rest of the firm's activities. To qualify as a clearing agent, a member must demonstrate certain operational capacities:

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[45] ISE Rule 79a(12).

- It can record trades submitted to it and check unmatched or alleged bargains during the course of the day.
- It can deliver to clients (if they have a London office) by 8:30 a.m. statements received from the clearinghouse at 8:00 a.m. the same day.
- It has made satisfactory arrangements with its bank for transfers of cash, checks and securities.
- It can produce up-to-date records at all times.
- It can produce a monthly balance sheet for its clearing function, separate from the accounts of its parent firm.

In addition, clearing agents must maintain detailed ledgers for each firm or individual for whom they clear.

Guarantee Fund

There are three layers of investor protection. The internal resources of the clearing members constitute the first layer. By its capital requirements and supervisory apparatus, ISE hopes that these resources will be adequate at least for lesser defaults by the members' customers. Should a member default, ISE itself with £198 million in capital as of March 24, 1988, stands behind LTOM contracts. To reimburse the exchange for its losses, LOCH maintains a guarantee fund. Contributions to this fund, which may be in the form of a bank guarantee, are called from members according to the average level of margin called by the clearinghouse over the most recent three-month span.

Average Daily Margin	Contribution to the Guarantee Fund
Under £2.5 million	£125,000
£2.5 million - £5 million	£150,000
Over £5 million	£200.000

The guarantee fund amounts to between £5 million and £6 million.[46]

The third layer extends protection down to the ultimate purchaser or writer of options. Prior to August 29, 1988, ISE maintained a Compensation Fund[47] to cover losses suffered by members of the public as a result of the failure of a member of the exchange. (Investment firms and other members were not eligible to draw upon the fund.) However, on that date the Securities and Investment Board activated a new Compensation Fund to cover all investment business in the United Kingdom. (See below.) ISE then disbanded its own fund.

Either Compensation Fund comes into play, however, only when the exchange is compelled to liquidate clients' positions at a loss. Prior to 1988, ISE (unlike the regulatory authorities in the U.S.) had no authority to transfer accounts from a failed firm to another firm without the clients' permission. If the clients did not give permission to a transfer, their accounts had to be liquidated. New members' clients in 1988 and all clients in 1989 onwards must give such permission as a condition of maintaining an account. The ability to make such transfers will reduce the likelihood of drawdowns against the Compensation Fund.

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[46] LOCH cannot assess its members for additional contributions if the guarantee fund should become depleted.

[47] The assets of this fund totalled £2.5 million on March 24, 1988.

Linkages between Exchanges

LIFFE is forging links with other exchanges as part of a movement to around-the-clock trading. The links will require the exchanges to eliminate slight differences between similar contracts traded on them. Currently, traders take advantage of pricing differences caused by the variations in contract terms to arbitrage similar contracts across different exchanges. With the link-ups, the arbitraging opportunities stemming from contract differences will be gone.

LIFFE's first link-up was with the Sydney Futures Exchange (SFE). The link-up was inaugurated in October 1986 with two contracts, three-month Eurodollar futures and U.S. Treasury bond futures. These contracts are identical in all respects and cleared by ICCH in London for both exchanges. The trading day now starts with trading in Sydney from 8:35 a.m. to 4:15 p.m. (9:35 p.m. to 5:15 a.m. in London in the winter or 11:35 p.m. to 7:15 a.m. in the summer), breaks for at least one hour, and resumes at 8:15 or 8:30 a.m. (depending on the contract) in London. Contract positions opened in Sydney thus can be closed intra-day in London.[48]

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[48] See Section IV below for a discussion of the margination and settlement of contracts traded in Sydney. CBOT and SIMEX also trade the U.S. Treasury bond future. The CBOT/SIMEX contract is not fully compatible with the LIFFE/SFE contract. Between the four exchanges, trading continues 22¼ hours a day in the northern hemisphere winter and 20¼ hours in its summer.

A proposed link-up with the CBOT has been postponed both for logistic reasons and because resources at CBOT are being diverted to more pressing domestic regulatory issues. Indeed, there is some question whether the link-up will be implemented: CBOT may well opt instead for early morning trading hours, thereby extending competition with LIFFE.

LTOM had attempted to link up with the Philadelphia Stock Exchange (PHLX) to trade currency options. The Options Clearing Corporation (OCC) was to process, clear, and guarantee any LTOM positions transferred to the United States. However, despite extensive preparation, the link-up had never become effective; the effort has since been abandoned.

Players

The roles of the major players in the market--hedger, speculator, broker, and local--cut across institutional lines. Approximately half of the investors in the short-term interest-rate instruments are either banks or their customers.[49] The banks usually use the futures and options to hedge their assets and liabilities; they also use them in swaps. However, the British

[49] "LIFFE Celebrates Its 10 Millionth Contract," International Financing Review, no. 621 (May 10, 1986), p. 1410.

discount houses are often in the market as speculators.[50] The main users of the long gilt contracts are the gilt market-makers on ISE.[51] After banks and market-makers, most of the remaining investors are institutions. For the FT-SE 100 index contracts, approximately 75-80 percent of the open interest is attributable to non-members, primarily institutions.[52] Securities firms may participate as principals, as well as agents for their customers. Some of them arbitrage where that is possible. For example, Goldman Sachs and Shearson Lehman Brothers are known to arbitrage price discrepancies in U.S. Treasury bond futures between LIFFE and CBOT.[53]

The locals may be either individuals or corporations. They may follow the action from pit to pit. London Commodity Futures, a broker, sponsors a large number of locals. Midland Bank has also acted as a local in U.S. Treasury bond futures.

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[50] A discount house is one of eight firms that specialize in making markets in money-market instruments. The Bank of England deals solely with discount houses in its daily management of monetary policy, much as in the U.S. the Federal Reserve trades with primary government securities dealers.

[51] "Threats to London's Futures," The Economist (June 18, 1988), p. 77.

[52] ISE, "Market Inter-relationships and Derivative Products," Quality of Markets Quarterly (Winter 1987/88), p. 40.

[53] "T-Bond Futures on LIFFE," International Futures Review, no. 112 (December 15, 1984), pp. 12-13. First Chicago Futures Inc., a unit of The First National Bank of Chicago, was granted permission by the U.S. Comptroller of the Currency in May 1988 to engage in similar arbitrage.

Regulators

Under the Financial Services Act, adopted in 1986, authority for the regulation of all securities and commodities activities in the United Kingdom rests in a Securities and Investment Board (SIB).[54] Effective April 29, 1988, only two classes of persons may legally conduct an investment business: authorized persons and exempt persons. "Authorized persons," which must be formally recognized by the SIB, may be members of a self-regulatory organization (SRO), members of a recognized professional society, or certain other entities. "Exempt persons" include the Bank of England and recognized investment exchanges and clearing-houses.[55] Both the authorized persons and the recognized investment entities are subject to regulation by the SIB or its delegates.[56] In addition, all entities are subject to the anti-fraud provisions of the Financial Services Act.

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[54] The Financial Services Act formally invests regulatory authority in the Secretary of State for Trade and Industry and allows him to delegate his powers to the SIB. The SIB's chairman is David Walker, formerly an official of the Bank of England. (Mr. Walker had replaced Sir Kenneth Berrill, SIB's first chairman, on June 1, 1988.)

[55] There are six recognized exchanges (ISE, LIFFE, and four other futures exchanges) and two recognized clearinghouses (ICCH and Gafta Clearing House Co., Ltd.). Neither LTOM nor LOCH are individually "recognized"; rather, ISE itself is.

[56] In addition, the Bank of England, in its role as overseer of commerce, finance, and foreign exchange, may exert some informal influence on the exchanges and clearinghouses.

The SIB, in turn, delegates to the SROs authority to regulate investment firms' dealings with their customers.[57] These organizations initiate rules, subject to the SIB's approval, and carry on daily supervision of member entities.[58] The Association of Futures Brokers and Dealers (AFBD), founded in October 1984 and officially recognized by the SIB in January 1988, has responsibility for all futures and options except those based on equities or stock indices. It ordinarily supervises the members of LIFFE. Members of ISE are normally supervised by The Securities Association (TSA), founded in 1986 as an offshoot of ISE's existing regulatory apparatus. Members of both LIFFE and ISE are subject to regulation by both AFBD and TSA. These firms are assigned to a lead regulator, whose regulations will be controlling in case of conflict with those of other SROs. As the structure, purposes, and procedures of the two SROs are generally similar, we shall discuss only AFBD below.

AFBD requires that its members be "fit and proper" persons to carry on an investment business. Among other things, members must:[59]

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[57] There are five SROs, of which four have been officially recognized as of March 1988. The exchanges and clearinghouses continue to regulate dealings among themselves and their members.

[58] The self-regulatory organizations may devise rules and regulations different from those of the SIB. However, the former must provide protection to investors at least equivalent to the latter.

[59] The Association of Futures Brokers and Dealers, An Introduction (n.d.; probably 1987), p. 8.

- enjoy a financial and business standing suitable for membership,
- comply with the spirit and letter of rules for the conduct of business,
- ensure that their employees are themselves fit and proper persons, and
- have financial resources adequate to carry on investment business.

If AFBD should determine that a member is no longer a "fit and proper person," he presumedly could be excluded from membership and thereby lose his license to carry on an investment business. AFBD makes whatever independent enquiries and checks are necessary, including contacts with other regulators in determining whether a member or prospective member is such a "fit and proper" person.[60]

AFBD has rules for customer protection and financial standards, as well as for membership. The customer protection rules include regulations concerning:

> Conduct of business. The broker-dealer must know his client, provide a written agreement covering services and fees, disclose potential conflicts of interest, and ensure that the customer is given best execution in trades.
>
> Segregation of customer funds. Separate bank accounts must be established to protect customers' money in case of the firm's bankruptcy.
>
> Unsolicited calls. Such calls are restricted.
>
> Advertising. Advertisements must be fair, clear, and true.

Because the frequency of intra-day trading and the transnational nature of some trades make full compliance with the rules for

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[60] The provision of false information or the withholding of relevant information would weigh against a favorable determination.

segregated customers cumbersome, four classes of customers are allowed to opt out of the customer protection rules.[61] They are:

> The professional investor, e.g., another broker-dealer
>
> The business investor, who trades as an inherent part of a business that is not itself an investment business
>
> The experienced investor, who frequently enters "into investment transactions of such substantial size or so substantial in relation to his total wealth that he may reasonably be expected to appreciate the risks involved"[62]
>
> The execution-only customer, "who, without express invitation, instructs a member to effect transactions for him in circumstances where the member firm may reasonably assume that he is not relying on his advice as to the suitability of those transactions."[63]

These exceptions appear to exempt the majority of trading volume from the customer protection rules.

Members of AFBD are required to maintain minimum levels of unencumbered liquid resources and to submit regular and frequent financial reports. They must observe a wide range of record-keeping requirements and give AFBD access to their books and records at all times. AFBD conducts inspections of each member at least once a year and more often as needed. The SRO, acting on

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[61] These waivers are a concession made by SIB, which initially wanted to have all customer funds in all securities markets segregated, in recognition of the special nature of futures and options trading. It should be noted that the special classes of investors listed here are eligible to trade in off-exchange instruments, including over-the-counter options and "home-made futures." (The SIB seeks to restrict the trading of individual investors to recognized exchanges.)

[62] AFBD, op. cit., p. 15.

[63] Ibid.

authority from SIB, can even intervene in running the members' businesses.

The requirements of the Financial Services Act brought a large increase in the membership of AFBD. As of October 1988, it reported having 278 members fully authorized to conduct an investment business, with another 100 or so applications being processed. Authorization is not automatic; several firms have been denied it.

AFBD's rules are administered by a Council acting through appointed committees and executives. The Council consists of a maximum of 16 individuals, including its chief executive officer, eight practitioners elected by the ordinary members, not more than three representatives of futures exchanges appointed by the Council, and not more than four appointed representatives of the public. There are presently four committees--Membership, Finance and General Purposes, Business Conduct, and Rules--an Appeals Board, and an Arbitration Panel. AFBD's chief executive is Mr. A.I. Annand.

AFBD finances its operations with membership fees (based on the number of personnel--the smallest firm pays £1,750 annually), application fees (£2,000 per applicant), contributions from the exchanges, and a 1 pence assessment on every lot traded.

Compensation Fund

One provision of the Financial Services Act required the SIB to establish a Compensation Fund to insure investors against losses in the event of default of their broker-dealer.[64] The new fund, which became operative on August 28, 1988, is essentially an unsecured loan facility for £100 million granted to the fund operator, The Investors Compensation Scheme Ltd., by an international syndicate of twelve banks, led by SG Warburg.[65] The fund will insure any single private investor for up to £48,000 in losses, up to a maximum of £100 million in any one year. If aggregate claims should exceed that amount, payment will be scaled down. Only customers of firms fully authorized by the SROs to conduct an investment business are covered; customers of firms with only an interim (provisional) authorization are excluded.

The costs of the fund, both operating and repayment of drawings, will be levied in arrears at the end of each fiscal year on the SROs, which constitute its immediate clients. Should a default give raise to a claim on the fund, that SRO within which

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[64] This fund does not necessarily displace separate funds run by the exchanges, but at least one--ISE--has discontinued its own fund because of it.

[65] Other banks in the syndicate are Banque Nationale de Paris (London branch), Barclays, Commerzbank, Dai-Ichi Kango Bank, Deutsche Bank, J.P. Morgan Securities, National Westminster, The Royal Bank of Scotland, Sumitomo Bank, Swiss Bank Corporation, and Union Bank of Switzerland. Barclays, National Westminster, and The Royal Bank of Scotland are also co-owners of ICCH.

the default occurred would have to repay the drawings, up to a limit. Above that limit, all SROs will share in the costs.

III. Exchange-traded Instruments

Financial futures and options may be classified into three groups: interest rate, currency exchange rate, and stock index. Some of them, particularly the currency instruments, are also traded on other exchanges outside the United Kingdom.

One feature common to all futures and options traded in London (except the Japanese bond future) is that there presently are no limits to their daily price movement, although temporary limits have existed in the past.[66] Further, there are no position limits on LIFFE; LTOM has limits.

Interest-Rate Futures

Futures are traded on the LIFFE against two three-month interest rates, three maturities of gilts, and three foreign government bonds (American, Japanese, and German). See Exhibit V-A for full specifications of the mechanisms of trading.

Three-month interest rate contracts are available in £500,000 units for sterling and in $1 million units for Euro-dollars. Initially, these contracts entailed optional delivery in that the holder of the long futures position had the right to take

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[66] When prices hit a limit of a band about the previous day's settlement prices, trading for the ensuing hour would be constrained to prices within the band. At the expiration of the hour, trading could proceed without any price limits. (Such limits did not apply during the last hour of trading or during a "spot period" prior to delivery.) These limits were abolished in 1985.

a deposit in a bank account in London arranged by the holder of the short position. The delivery feature was seldom utilized, however, and formally dropped in December 1985. Now these contracts are settled only in cash.

The futures quotation for these two contracts is 100 minus the interest rate, so as to maintain similarity with quotations for bond futures. The minimum price movement, or "tick," is one basis point. Delivery months for these and all other LIFFE futures (as well as the expiry dates for options) are on a quarterly cycle (March-June-September-December). Trading ends at 11:00 a.m.[67] on the third Wednesday of the delivery month (for sterling deposits) or two business days previous (for Eurodollar deposits). Cash settlement is the next business day after trading ceases.

The exchange delivery settlement price for both three-month contracts is based on the interest rates being offered to prime banking names by 16 major banks, selected at random from a list of designated banks, between 9:30 a.m. and 11:00 a.m. on the last trading day. The three highest and three lowest quotes are discarded. The final settlement price is determined as tne arithmetic average of the remaining ten quotes.

The long gilt contract (based on a nominal bond maturing in 20 years) has become by far LIFFE's most actively traded

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[67] All times are London times unless otherwise indicated.

contract after the Big Bang in October 1986, when the number of market-makers jumped from two to 27. It greatly increased liquidity in the marketplace. As proof, bid-asked spreads in the cash market are tight, 2 basis points, when both the cash and futures markets are open. When futures trading ceases at 4:15 p.m., spreads widen to 6-8 basis points for the remainder of the day's trading in the cash market (which closes at 5:00 p.m.).[68] Subsequently, a medium gilt contract (utilizing gilts maturing in 7 to 10 years) was introduced to meet the needs of market-makers at the shorter end of the maturity spectrum. A short gilt (utilizing bonds maturing in 3 to 4 1/2 years), introduced earlier, had proved unsatisfactory for their purposes.

The long and medium gilt contracts are in £50,000 nominal amounts, with each tick at 1/32 of a pound (£15.625 for the contract). As shorter term gilts vary less in price than long term gilts, a short gilt exists with twice the nominal value--£100,000--but half the tick size--£1/64--as the long and medium gilts. Thus the value of a tick, £15.625, is the same across all three contracts.

The long gilt future is based on a notional gilt-edged bond (called "stock" in England) with a 9 percent coupon, maturing in 20 years. The 9 percent coupon applies to all futures delivered

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[68] "LIFFE Long Gilt Futures Set the Pace," International Financing Review, no. 656 (January 17, 1987), p. 250.

in September 1988 or later; previously, a 12 percent coupon had been the standard.[69] Any gilt maturing in between 15 years and 25 years may be substituted for the standard.[70] Gilts actually delivered are adjusted to the standard by means of a conversion factor. The amount invoiced is given by the following formula:

Invoice amount = [(settlement price) X (conversion factor) X (nominal amount)] + (accrued interest).

Tables of conversion factors and accrued interest are published for each futures contract.

The medium gilt future is based on a notional gilt with a 9 percent coupon. Any gilt with 7 to 10 years remaining to maturity and a coupon less than 14 percent may be delivered. The short gilt future was originally based on a notional gilt with a 10 percent coupon, but want to a 9 percent coupon starting with the September 1988 delivery month. Any gilt with a remaining maturity of 3 to 4 1/2 years may be delivered.

Delivery of the gilts may be on any business day in the delivery month, at the seller's (short's) option. Holders of long

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[69] The change was made to broaden the range of deliverable stock. It was discovered that with a 12 percent nominal coupon, the futures contract was tracking a single gilt issue that happened to be by far the cheapest to deliver.

[70] For gilts with an optional redemption date, the relevant maturity date is the first redemption date. No variable rate, index-linked, convertible, or partly paid gilts may be delivered. Stocks are not deliverable if the delivery date falls on the business day before, during, or on the business day after their special 3-week ex-dividend period. Interest on the delivered gilts must be payable half-yearly. These restrictions also apply to gilts delivered against the medium gilt and short gilt contracts. However, the restriction on the ex-dividend date does not apply to the short gilt.

positions who do not wish to take delivery therefore will normally have closed out their positions before the delivery month. The last trading day for all gilt contracts is two business days before the last business day in the delivery month.

A future based on a notional 8 percent U.S. Treasury bond was introduced in 1984. Initially, it differed from a similar $100,000 contract trading on the Chicago Board of Trade only in ending its delivery period two days earlier. This enabled traders to take positions in London and unwind in Chicago. LIFFE changed its settlement, effective with the contract expiring in September 1987, to match exactly CBOT's contract and thereby eliminate the potential for this type of arbitrage.[71] Now LIFFE uses Chicago's settlement price, determined at 8:00 p.m. London time (2:00 p.m. Chicago time), as its exchange delivery settlement price. On each day in the delivery month, traders have until 2:00 a.m. London time (8:00 p.m. Chicago time) to give notice of delivery.

A copy of the Japanese government bond (JGB) futures trading on the Tokyo Stock Exchange was introduced in London in July 1987, following an 18-month development period. The contract size, 100 million yen, is large; the tick value, 10,000 yen, is by far the largest for all futures and options traded on LIFFE. The spread between the bid and the offer during the trading day is

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[71] There still is heavy arbitrage of price differences during the two hours each day when both CBOT and LIFFE are trading the contract. Deborah Hargreaves, "Hopes Fade of LIFFE-CBOT Link," Financial Times (London, March 22, 1988), p. II-17.

often as wide as 7-8 ticks.[72] Also, the contract is volatile. All these factors heighten risk for traders. Consequently, only three or four locals have been attracted to the JGB trading pit.

The JGB futures is the only LIFFE contract with price limits. Once the price moves one percent of nominal (value of one million yen) from the closing price on the Tokyo Stock Exchange, no trading is allowed outside the limits for the following one hour. After the hour is up, there are no price limits for the remainder of the day. There are no price limits during the last hour of trading each day.

There are a few differences between the JGB futures contracts trading in London and Tokyo. The most important difference is that the LIFFE contract is cash-settled, while the Tokyo contract always results in delivery. LIFFE adopted cash settlement in order to sidestep a withholding tax on interest on bonds delivered in Tokyo.[73] Other differences between London and Tokyo are:

- Only the two nearest delivery months are presently traded in London; up to five delivery months are available in Tokyo.
- The initial margin is 1 percent of the nominal value in London, versus 3 percent in Tokyo.

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[72] "JGB Futures Trading on LIFFE Proves Satisfactory," International Financing Review, no. 693 (October 3, 1987), p. 3231.

[73] The tax would complicate delivery procedures because it applies only to bonds delivered to or received by taxable parties, but not to trades between two tax-exempt parties. The CBOT intends to allow physical delivery when it introduces its own version of the contract.

- Trading costs are lower in London than in Tokyo.

Despite London's advantages and the lack of competition from Chicago, trading volume in the initial months has been low.[74]

The German government bond (bund) futures is LIFFE's newest instrument. Unlike the U.S. Treasury bond and the Japanese government bond futures, there was no comparable futures contract trading in the home country at the time of its introduction in London. This contract is based on a notional bond with a 6 percent coupon. Any Bundesanleihe with 8½ to 10 years remaining to maturity may be delivered through the domestic German securities clearing system, the Kassenverein.

Interest-rate Options

All interest-rate options on LIFFE are options on a futures contract: 3-month sterling interest rate, 3-month Eurodollar interest rate, long gilt, and U.S. Treasury bond (Exhibit V-B).[75] Exercise is American-style, e.g., exercise may be made anytime prior to the expiration of the option.

All LIFFE interest-rate options commence trading two minutes after the underlying futures contract and end trading

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[74] There is no overlap between trading hours in the futures markets in London and Tokyo. The Japanese cash market closes at 5:00 p.m. local time, two hours after the futures market, presenting a 50 minute overlap with the LIFFE futures market in the summer, but no overlap in the winter.

[75] The interest-rate options which traded on LTOM from 1986 to 1988 were for the delivery of specific gilts.

simultaneously with the underlying. Options on the two 3-month interest-rate futures follow the underlying closely as to particulars of the price quotation, tick, and last trading day. They may be exercised by 5:00 p.m. on any trading day, with delivery the next business day. At least 13 exercise prices are listed, pegged at 0.25 percentage point intervals.

For the long gilt and U.S. Treasury bond options, the tick size is half that for the underlying futures contract. Since for these two futures, delivery may be on any business day in the delivery month, the options contract expires in the calendar month prior to the pertinent futures delivery month. (To be precise, expiry is six business days prior to the first delivery day of the underlying. Thus, for example, a "March" option actually expires in February.) Seven exercise prices are initially offered, pegged at £2 or $2 intervals.

In stark contrast to American practice, the full premium for LIFFE options is paid by the buyer to the seller not upon purchase, but upon exercise or gradually as its time value erodes. Instead of exchanging a premium, both buyer and seller post initial margin. The margination system is designed to facilitate cross-margination between futures and options derived from the same instruments. (See Section VI for an explanation.) Not receiving the entire premium up-front could, of course, discourage some traditional sellers of options who do not trade futures. The

sellers could also demand higher premiums to compensate them for the loss of access to the funds.[76] Buyers, on the other hand, would benefit from receiving payments similar to variation margins without the need to exercise or sell their positions.

ICCH automatically exercises selected in-the-money options just prior to expiry. (See Section VI below for particulars.) LIFFE options cannot be abandoned, e.g., if the option is in-the-money at expiry, contract terms require the holder of a long position to exercise the option.

Currency Futures and Options

Five currency futures are traded on LIFFE (Exhibit VI-A). Four of them--for British sterling, Deutsche marks, Swiss francs and yen--are quoted "American style," in dollars per unit of exchange currency. These four contracts, all introduced in 1982, are generally similar as pertains delivery and settlement. Deliveries, where required, are made in the principal financial centers of the home countries.[77] The sterling/dollar future has a smaller tick value ($2.50) than the other three American-style currency futures ($12.50).

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[76] The premium would be increased by a factor exp(rt), where r=the riskless interest rate in the currency of the premium and t=time. M. Desmond Fitzgerald, Financial Options (London: Euromoney Publications, 1987), p. 149.

[77] While approximately 2 full days after cessation of trading are available to deliver sterling, Deutschmarks, and Swiss francs, only 1-1/2 days are available to deliver yen because of the time differences between London and Tokyo.

In January 1986 LIFFE introduced its first contract quoted "European style," e.g., the quotation is foreign currency per dollar. This contract, for $50,000 priced in German marks, was an attempt to appeal to European customers, particularly banks, that are accustomed to thinking in terms of local currencies.

LIFFE and LTOM both offer option contracts on sterling and marks (Exhibit VI-B). Six expiry dates are offered for each class of options: the three nearest months plus the quarter-end months. All contracts are quoted American style, except LIFFE's dollar/deutschmark contract, which is quoted European style. Even the two sterling contracts differ significantly. LIFFE's contract is twice as big and has smaller ticks than LTOM's contract. LTOM imposes a position limit of 10,000 contracts on each of its currency options.

For LIFFE's sterling option contract, at least three nights and two business days must pass between exercise of an option and delivery, closely correlated with the two nights and two business days between the termination of trading in futures and delivery. Delivery under the option contract is either before or simultaneous with delivery under the futures contract. LIFFE's dollar/mark option is analogous to its sterling/dollar option except that one additional night is allowed to exercise the option after cessation of trading. For both contracts, the delta mechanism for initial margination is used. At least five exercise

prices are listed for each option, in intervals of 5 cents per pound or 5 pfennings per dollar. (The intervals are 5 cents for LTOM's sterling contract and 1 cent for its deutschmark contract.)

Stock Index Instruments

The Financial Times-Stock Exchange 100 share index (FT-SE 100), also known as the Footsie Index, was created on January 3, 1984, to be reasonably representative of the London stock market and capable of being continuously updated. This index is composed of the 100 largest domestic companies on the ISE, weighted by market capitalization.[78] These 100 firms represent approximately 70 percent of the value of all U.K. equities. Defined to be 1000 on January 3, 1984, the index peaked at 2443.4 in July 1987.

LIFFE introduced a futures contract on the FT-SE 100 on May 3, 1984, while LTOM introduced an option on the same day. (In 1986 LIFFE introduced an option based on its futures, but this was discontinued in 1988.)

The characteristics of LIFFE's future and LTOM's option are substantially different (Exhibit VII). LIFFE's contracts are for units of £25 times the index; LTOM's contract is for units of £10 times the index. The future is deliverable on a quarterly cycle; series of options expire in four consecutive months.

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[78] The FT-SE 100 is calculated using the average of bid and ask prices, not actual transaction prices. Components issues are replaced quarterly if a component falls below 110 in a ranking of capitalization and a suitable replacement attains a ranking of 90 or better. The weightings are adjusted to preserve the continuity of the index.

The minimum price movement for a futures contract is one-half an index point (the tick value is £12.50). The LTOM option has a bigger tick, equivalent to a one-half index point (tick value £5).[79] Exercise prices intervals are established every 50 index points and called pence. Their margination systems are also substantially different. (As part of a rapprochement between the two exchanges, in September 1988 LTOM changed its trading hours to coincide with LIFFE's hours.)

The maximum position on the LTOM that any one party or group acting in concert may hold is 20,000 contracts.

Margin requirements for the FT-SE 100 contracts have been changed several times since London's stock market crashed in October 1987, concurrently with a similar crash in the United States. Before the crash, initial margin for the futures contract was £1,500. On October 21, 1987, the day after the index dropped 12.2 percent, ICCH increased the initial margin to £5,000, 11 percent of the value of the contract. The clearinghouse also made three intraday margin calls that week, for £6,000, £7,500, and £5,000.[80] On November 2 initial margin was boosted further to £7,500, 18 percent of the value of the contract. By January 1988,

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[79] Recently reduced from a full point (tick value £10).

[80] "Market Interrelationships and Derivative Products" in ISE, Quality of Markets Quarterly (Winter 1987/88), p.42.

the margin had been reduced to £4,000; it was reduced again to £3,000 in February 1988 and to £2,500 in June 1988.

Similarly, on the night of October 21, 1987, LOCH increased initial margin on LTOM's option to 12.5 percent of the underlying contract value plus the in-the-money element or minus the out-of-the-money element, subject to a minimum margin of 3 percent of the underlying. Before the crash, margin calculations were based on 7.5 percent of the underlying, subject to a minimum margin of 2 percent. LOCH had also made an intraday margin call on October 20. Its margin requirement remains at 12.5 percent at the latest count.

The LIFFE futures and LTOM options contracts settle in cash at the "exchange delivery settlement price" (EDSP) on the last trading day. The EDSP is determined by taking eleven index values (from the stock market) at one-minute intervals between 11:10 and 11:20 (when trading ceases) on the last trading day, dropping the highest and lowest values, and averaging the remaining nine.

The fact that the EDSP is an average of index values makes it theoretically impossible (except by luck) to undertake arbitrage between futures and a market basket of stocks that does not entail market risk. We understand that little index arbitrage takes place.[81] Arbitrage is hindered by high transaction costs for

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[81] See, for example, Dominique Jackson, "Index Arbitrage Remains in the Doldrums," Financial Times (London, October 7, 1988).

stock trading and restrictions on shorting of stocks. Commission rates on the ISE are high, and a stamp duty is imposed on the purchase of equities.[82] Shorting is limited to a two-week period, except for market-makers. Low liquidity in the futures market has also been cited as a deterrent to arbitrage, although arbitrage, if practiced widely, would itself increase liquidity.

Nevertheless, market-makers in FT-SE 100 options use futures extensively to offset their risk.[83] Indeed, we understand that market-makers account for between 30 percent and 40 percent of all trading in the FT-SE 100 instruments.

IV. Trading Mechanisms

The trading processes on LIFFE are generally similar as between futures and options. These common features are described in the first subsection below. Features particular to options trading are discussed in the second subsection. The second subsection also shows that trading mechanisms on LTOM are similar to those on LIFFE in form, but different in detail.

General Mechanisms on LIFFE

Trading is by open outcry. Customers' orders are phoned to a booth of an exchange member on the trading floor, where they

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[82] "Big Bang for LIFFE," International Financing Review, no. 642 (October 4, 1986), p. 3000.

[83] "Market Interrelationships and Derivative Products," p. 42.

are entered onto an order slip.[84] After the order slip is time-stamped, the order is signaled, shouted, or sent by runner to a trader in a pit. The traders make their offer or bid in an audible voice. (On LIFFE, hand signals may be used to supplement voice, but they cannot substitute for it.) Any offer or bid remains valid only for a very brief period: one or two seconds on slow days and less than a second in brisk trading.[85] When the bid or offer is accepted by another trader, it becomes a contract between the members for whom the traders acted.[86]

Traders must execute client orders in order of, first, best price and, second, time of receipt. Client orders must be executed before a trader can trade on behalf of himself or his firm.[87] Also, traders initiating a trade may split it between two or more counterparties. Such "sharing" of a trade is a helpful

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[84] Trades initiated by a trader for his own account or his house account do not have to be entered onto order slips.

[85] LIFFE, Trading Procedures (for futures; 1984), Procedure 4.4.3. Hereafter cited as "LIFFE Futures Procedures."

[86] LIFFE Rule 4.11 as implemented by LIFFE Futures Procedure 4.4 and LIFFE, Trading Procedures in Respect of Options Contracts (1985), Procedure 3.10. The latter is hereafter cited as "LIFFE Options Procedures." Exchange staff continuously report bid, offer, and transacted prices from the pit; these go into video displays in the pit, to information vendors, and to subscribing members' booths. (During very hectic periods, only significant transactions are reported, with no bid or offer prices. When this happens, a sign denoting "fast market" is posted in the exchange.)

[87] LIFFE Futures Procedure 4.6.3 and Options Procedure 3.12.3.

compromise when it is unclear which prospective counterparty was first to accept the initial bid or offer.

Trades should be made reasonably close to what may be called a "market price." If a transaction is made so far outside the prevailing market as "to bring the market into disrepute," it may be cancelled by the Pit Committee.[88] The cancellation must be done before any clearing slips have been entered into the clearing system.

After executing the order, the trader notes the deal on a personal trading card, which is passed on to the booth. Details of the execution are noted on the order slip, which is then time-stamped again. (The trading card is returned to the booth even if there is no order slip, e.g., the trade was for the trader's own account.) The trade is then confirmed by telephone with the member firm or directly with the customer. Except as noted below, the trader, his staff, or his clearing member's staff also prepares a clearing slip, which is deposited in a collection box on the exchange floor. (There are separate boxes for futures and for options. The member may wish to give a duplicate copy of the clearing slip to his clearing member.) There is no set time within which clearing slips have to be completed during the day, but it is expected to average about 10 minutes. All clearing slips must

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[88] LIFFE Futures Procedure 4.10.2 and Options Procedure 3.16.2. ISE has a similar rule for its stock and options trading.

be completed and submitted to trade matching within 15 minutes of the close of trading.

The clearing slips are collected by LIFFE staff frequently throughout the day and entered into a trade matching system. The system displays listings of both matched and unmatched trades on the exchange floor. (Unmatched trades result from the lack of a matching clearing slip--this is the most common problem, duplicate clearing slips, errors by either party in entering trade details, or keypunch errors.) All unmatched reports must be promptly resolved throughout the trading day, but no later than 30 minutes after the cessation of trading, or else the trades are cancelled. (Resolution of unmatched trades is sometimes achieved by agreement between counterparties, each of whom retains his right to seek redress against the other by established dispute procedures.)

Over 1987-88 LIFFE introduced an electronic Trade Registration System (TRS), which, among other features, enables members to keypunch trades directly into LIFFE's computer, thus dispensing with clearing slips. Such "direct member input" is optional; only six members keypunched their own trades as of August 1988. LIFFE hopes that more members will input trades, thereby reducing the use of clearing slips. (However, clearing slips will continue to be available as back-ups in event of computer malfunctions and for use on busy days, when members are unable to

keypunch all trades reasonably quickly.) TRS also displays either side of unmatched trades, enabling back-office staff to work immediately on resolving the mismatches. However, the actual resolution of unmatched trades still must be done on the trading floor, not on computer terminals.

LIFFE's trade matching systems give the exchange the capability of monitoring members' positions on a real-time basis. If the system detects a large position building up, exchange staff will intensify their monitoring of the responsible firm and possibly get in touch with it to obtain an explanation for the trading.[89]

Order in LIFFE pits is maintained by pit observers, headed by a senior pit observer. If two parties should dispute an alleged transaction and cannot resolve the matter, they shall notify the senior pit observer. He attempts to mediate the dispute and may require either or both parties to limit their potential losses by making an appropriate contract in the pit.[90] Should the pit observer be unsuccessful at resolving the dispute, he must call a meeting of the Pit Committee (typically at the next lull in trading). The decision of the Pit Committee shall stand for the time being and be subject to arbitration.

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[89] ICCH, as the counterparty to the trades, also monitors positions using its own computer systems; ICCH also has access to LIFFE's systems.

[90] LIFFE Rule 4.7.1.

Misconduct on the trading floor is reported by the floor manager to a Floor Committee, which may impose a fine and, in serious cases, recommend to the Membership and Rules Committee that an individual's registration be suspended.

The floor manager and pit observer may halt trading in the event of a fire alarm or other alert. In very exceptional circumstances the market may be temporarily closed because it has become too disorderly.[91] Such a closing can occur only on the concurrence of (a) the pit observer, (b) the Pit Committee, (c) the chairman or any two other members of the Floor Committee, and (d) the chief executive or floor manager of LIFFE or their acting deputies.

Options Trading

Trading in LTOM differs in some details from that on LIFFE. In addition, two mechanisms--the rotation and the use of market-makers--are particular to options trading, whether on LTOM or LIFFE. This subsection reviews the trading procedures on LTOM and notes the mechanisms adopted by LIFFE Options.

Trading on LTOM is by open outcry. Orders, complete with a client identification number, are entered onto a dealing slip (the counterpart of LIFFE's order slip) and given to a trader in

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[91] LIFFE Futures Procedure 4.20.2 and Options Procedure 3.41.2.

a pitch[92] for execution. Besides traders, the crowd in each of LTOM's options pitches includes market-makers and a board official. The board official, who is an employee of the exchange, assures the conduct of an orderly market, establishes opening and closing prices, and executes limit orders placed by members of the public (not exchange members).[93]

Whenever the volume of interest justifies it, trading on both LTOM and LIFFE commences each day with an opening rotation. On LTOM, the board official is given all limit orders that have been placed by members of the public before the start of trading. Taking one series at a time, he matches these orders so as to clear out either the buy or the sell side. While a LTOM rotation is in process, no other trading is allowed. On LIFFE, by contrast, an exchange official asks for bids and offers in a series and establishes a price for the opening. Opening transactions must be at that price. The LIFFE official does not himself match the orders, however. Trading in opened series may henceforth continue while the official opens additional series.

During the remainder of the trading day on LTOM, public limit orders may be given to the board officials by broker-dealers. The higher bid and lowest offer are placed on a board on the floor

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[92] A pitch is akin to a booth or post. There are no pits in LTOM.

[93] In executing limit orders, the board official performs one of the functions of specialists on American options exchanges.

and are also shown on computer screens. The board officials execute these orders whenever the limits are reached in trading.[94] These orders take precedence over trades offered or bid by other members of the crowd.[95] Further, if it is possible to trade at a better price than the limit price, the board official must trade at the better price. At the instant when trading ceases for the day, the board official conducts a "closing rotation," calling out the prices of orders in his charge. The highest offering prices are used for the calculation of margin requirements. (Such a rotation does not occur on LIFFE. The prices used in daily settlement are determined by ICCH; usually, ICCH accepts settlement prices reported by LIFFE. LIFFE, in turn, normally bases its prices on actual transactions, obtained from the price reporting system.)

LTOM's market-makers[96] must always be prepared to quote a price on at least one contract in every series (defined by a specific exercise price and expiry month) for each class of option (defined by calls or puts on a particular underlying security) for

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[94] Contingency, spread, or straddle orders are not accepted as public limit orders.

[95] Exceptions are made when the execution of a public limit order would prevent a spread transaction (involving two or more options at different strike prices of different months) from being executed.

[96] These are usually firms. None of them do clearing, although affiliates may. Individuals were first permitted to become market-makers in early 1987.

which it is registered.[97] They can only trade as principals, not as agents. (However, any given corporation can have both market-making and agency business so long as these activities are kept separate, including the employment of separate personnel in each.) Each market-maker must trade a minimum of one-half of the average trading done by all market-makers in his registered security. In addition, he must do at least 20 percent of all his trading in those options for which he is registered. If a market-maker fails to meet the minimum trading requirements, he is subject to a range of increasingly higher clearing fees, higher margin requirements, or, in the extreme, to loss of market-making privileges.[98]

Market-makers are relatively new to LIFFE, having first been appointed in October 1987 to make markets in its less popular options (e.g., all except the long gilt and U.S. Treasury bond contracts) in order to spur trading therein.[99] They must always be prepared to quote two-way prices in all their contracts, limit the bid-offer spread to a maximum number of ticks as agreed with the exchange, and be prepared to deal within the bid/offer spread up

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[97] Code of Dealing in The International Stock Exchange, London Traded Options Users' Reference Manual (March 1988). This manual is hereafter cited as "LTOM Manual."

[98] Elders Finance Group UK is presently the only active market-maker in the currency options. Seven firms make markets in the FT-SE 100 option.

[99] Market-makers on LIFFE include First Continental Trading Ltd., Gerrard & National Ltd., and MGA (London) Ltd. in short sterling options; First Continental Trading Ltd. in Eurodollar options; and Dresdner Bank AG in the British pound/dollar and dollar/mark options.

to a specified number of lots, also as agreed with the exchange. (The exchange may make different agreements with various market-makers, even for the same option.) However, unlike their counterparts on LTOM, LIFFE's market-makers are not required to trade at any minimum amount in a given period.

Traders on LTOM must note the particulars of a trade on the dealing slip and have it time-stamped within one minute of execution.[100] The dealing slip must be deposited in a collection box on the exchange floor within five minutes of the trade. These procedures contrast to those on LIFFE, where more forms are used and the time span from the trade to collection of the clearing slip can be much longer.

Board officials on LTOM are responsible for assuring an orderly market, a function performed by the pit observers on LIFFE. They attempt to resolve any disputes that may arise in the trading pitches. If they cannot, an ad hoc representative meeting of a Floor Committee is called. Unresolved disputes can be referred to successively higher authorities, the Options Committee and the Council of the exchange.

The board officials are required to halt trading whenever (a) trading in the underlying security or commodity has been halted or suspended, (b) when prices are moving too fast for public limit orders to be executed in an orderly manner, or (c) "when conditions

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[100] LTOM Manual, Section II.11.

or circumstances obtain which in his opinion render orderly trading impossible."[101] After a halt, trading may be resumed with another opening rotation.

V. Clearinghouse Operations for Futures

The clearing process starts with LIFFE, which matches the trades. Matched trades are sent to ICCH, which becomes the counterparty upon registration, collects the margin payments, and handles delivery.

Trade Comparison and Clearing

The matching of trades has always been done by LIFFE. Until recently, matching was the extent of LIFFE's involvement in the clearing process: all steps post-matching were handled by ICCH and its clearing members. Starting in September 1987 and continuing through the end of 1988, LIFFE gradually introduced a new Trade Registration System. TRS enables LIFFE members to identify mismatched trades and to enter additional trade data from computer terminals located in their back offices. Prior to TRS, unmatched trades had to be obtained from listings posted on the floor of the exchange (as noted above), and the clearing members entered missing data and made revisions using their own computer terminals, which, being fed by ICCH, were not available to non-clearing members. (See Exhibit VIII for a diagram of the clearing process.)

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[101] LTOM Manual, Section II.19.

At the bottom of the clearing slip are two particular boxes. One is for the mnemonic of the member for whom the trader may have acted as a broker. By filling in this box, the broker "allocates" the trade to the firm taking responsibility for it. The other specifies the account (house or client) to which the trader must "assign" a trade in accordance with SIB segregation requirements. If these boxes are filled in, the exchange enters the data into TRS. Otherwise, the trading firm's back office enters the data directly into its TRS terminal. Members must also "claim" trades which are allocated to them.[102]

LIFFE members are expected to process trades continuously throughout the day. As a general principle, all trades should be matched within 30 minutes of execution. Members are allowed an additional 30 minutes to allocate, assign, and claim trades. Thus, trades are fully specified and registered with LIFFE within one hour of execution. In practice, the day's work is done between 5:30 p.m. and 6:00 p.m., only a little over an hour after the closing of the market at 4:20 p.m. (This schedule represents a significant improvement over the situation that existed prior to the advent of TRS, when the members' work extended to 7:00 p.m. on normal days or to 10:00 p.m. on busy days.)

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[102] They may enter their claim even before the trader's firm has formally allocated the trade. Indeed, members may allocate and assign trades even before they are matched.

In order to facilitate the clearing, TRS automatically takes the following actions when members fail to act:

- Trades not assigned within 60 minutes of execution are assigned to the member's house account.
- Trades still unmatched 30 minutes after the cessation of trading are cancelled.
- Trades allocated (given up) to other members, but not claimed by them by the end of the day, are assigned to the would-be allocator's house account.
- Claims made, for which there are no corresponding give-ups by the end of the day, are cancelled.

TRS produces a limited number of reports approximately a half hour after it finishes processing data for the day. These reports show trades for the day and total volume. An expanded system, called the Trade Processing System, was scheduled to be introduced in late 1988-early 1989 to provide additional clearing services for LIFFE members. These services include: real-time position keeping; end-of-day processing of settlements, deliveries, and exercises; margin calculations; reports of corrections of trades; and reports of closing positions, margins, in-the-money options, and delivery/exercise instructions and allocations.

Both matched and unmatched trades are electronically transmitted from LIFFE's TRS to ICCH's Intercom system.[103] (Intercom stands for International Enquiry Response Systems for Commodity Markets.) This system gives clearing members access to trade data in real-time and the ability to update selected items

[103] Prior to TRS, only matched trades were transmitted from LIFFE to ICCH.

on-line. However, ICCH requires that TRS rather than Intercom be used if it is available.[104] As of January 1988, this system had 401 visual display units or printers in the members' offices, 16 at LIFFE, 40 at other exchanges, and one in New York. The system includes duplex computers to ensure the continuity of processing and an independent, off-site back-up installation.[105]

In normal circumstances, corrections to the clearing slips or allocations are permitted only on the day of the trade.[106] Four alternative correction procedures are available, depending on the stage of processing.

- If the trading slips do not match, the members must work with the exchange to resolve the mismatches before the trade can be reported to the clearinghouse.
- If the trading slips have been matched, but details have not yet been reported to ICCH, then any member may revise the erroneous trading slip and have it initialled by an exchange official.
- If details have been reported to ICCH, but not yet confirmed by the receiving party, then the clearing member requests LIFFE to submit a correction slip to ICCH to delete the trade.
- If either party to the trade has confirmed it, then both parties must "unconfirm" the arrangement before ICCH will delete the trade.

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[104] ICCH Procedure 2.1.5.

[105] Until 1988 Intercom utilized IBM mainframe computers. During the year and extending into 1989, Intercom was being transferred to newer Digital (DEC) equipment.

[106] ICCH Procedure 2.1.7.

ICCH requires that all trades be "confirmed."[107] Prior to OTRS, clearing members had to make the confirmations through an entry in their Intercom terminals. With TRS, however, LIFFE confirms the trades on behalf of its members by sending a signal to ICCH at the end of the day.[108]

Guarantee of Performance

Here we describe how performance on LIFFE contracts is assured.

All trades made on the floor of LIFFE are between members acting as principals.[109] If the member is not himself a clearing member, then his performance on the original contract made in the pit is guaranteed by his general clearing member.[110] Once matched trades are reported to ICCH and acknowledged by the respective clearing members, then up to three new contracts, identical to the original contract save for counterparties, arise: two between the floor members and their respective clearing members and one between

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107 ICCH Regulation 6.

108 ICCH Procedure 2.1.5.

109 LIFFE Rule 4.11.2.

110 LIFFE Rule 4.12.1.

the two clearers.[111] The original contract is thereby discharged. The clearinghouse is concerned only with the contract between the two clearing members.[112]

Confirmed contracts must be registered with the clearinghouse before ICCH becomes a principal thereto. Registration normally occurs automatically one hour after the contracts are confirmed by the clearing members through Intercom or, where TRS is involved, by the exchange in an end-of-the-day message unless ICCH gives notice of its intention to reject the contracts. Registration (and through it, ICCH's guarantee of performance) does not depend on the members' posting of margin.[113] Thus, as an operational matter, ICCH's guarantee normally comes in force between 6:30 p.m. and 7:00 p.m. on the day of the trade.

ICCH's guarantee is effected by novation.[114] A contract between the two clearing members, registered with ICCH, is replaced

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[111] LIFFE Rules 4.13.1 and 4.13.2.

[112] Separately, floor members may, if they choose, enter into contracts with clients identical (save for price and counterparty) to matching contracts traded on the exchange. LIFFE Rule 4.14.1.

[113] At least up to April 1988, margin was required before ICCH would register a contract. The requirement for margin was dropped in the October 1988 edition of ICCH's Procedures. ICCH Regulation 9 states that the current Procedures shall determine whether or not margin is required before registration. ICCH, General Regulations of the International Commodities Clearing House Limited (April 1988); hereafter cited as "ICCH Regulations."

[114] ICCH Regulation 1b.

by two new contracts, one with each member, with ICCH a counterparty to each.[115] In default situations, ICCH's role will be invisible to counterparties in the cases of cash-settled futures contracts and options contracts. If a commodity is deliverable, however, then the counterparty must give written notice of a claim against ICCH.[116] This claim must be delivered by 5:00 p.m. on the seventh business day following the day which the buyer would normally be obliged to pay for the goods. It is conceivable that ICCH would settle the counterparty's claim by making cash payment of any difference between the contract price and the market price of the underlying, rather than by fulfilling the terms of the original contract.

Failure of the clearinghouse to register a contract does not invalidate the contract. Contract terms provide that in the event that a contract is not registered, it remains in force and that the administrative procedures of the clearinghouse for delivery still apply, but modified such that payments and instruments are exchanged directly by the buyer and seller, rather than flowing through the clearinghouse.

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[115] ICCH Regulation 3a. The process of substitution of ICCH as a counterparty was not formally established until the present set of regulations went into effect on April 29, 1988. Prior to that, ICCH guaranteed the contracts and interpreted its guarantee to mean that it was a principal to the trade. The term, "guarantee," continues to be used under the new regulations, with a counterparty relationship understood.

[116] ICCH Regulation 22c.

Segregation of Accounts

As required by the Financial Services Act, ICCH establishes segregated client accounts for all member firms that require them.[117] Segregation, where applied, is thorough.[118] Margin requirements are calculated separately for segregated positions and all other positions. Separate bank accounts are established for each. Securities and bank guarantees used as cover are posted separately; they cannot be transferred directly from one account to the other. (To make transfers, the clearing member must withdraw the cash or collateral from one account and re-deposit it in the other.) Deliveries are made separately. All this is accomplished by assigning the segregated client account a mnemonic distinct from the clearing member's mnemonic. (The assignment is made automatically.)

A clearing member may have up to 19 non-segregated client accounts: one for himself (the "house account"), one for his non-segregated clients, a default account, and up to 16 accounts for non-clearing members for whom he clears. All these accounts are combined for the purposes of calculating margin and for delivery on futures contracts (or exercise of options). (The segregated

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[117] Prior to the implementation of the Act in April 1988, segregated client accounts existed only for options positions.

[118] ICCH Procedures, Section 4. Members of certain active classes of clients can opt out of the segregation requirements, as discussed in the subsection, "Regulators," in Section II above.

clients' accounts of the non-clearing members are all combined into the one clearing member's segregated client account.)

Margination or Daily Settlement

This sub-section discusses initial margin, daily settlement, and cover (or collateral) for margin debits. "Initial margin" is what is known as "original margin" in the U.S. The term "variation margin," prevalent on American exchanges, is not used except in reference to contracts being delivered; instead, the term "daily settlement" is utilized.[119]

ICCH determines the amount of margin to be posted for each contract.[120] Initial margins (also called "deposits") for LIFFE futures contracts are determined from an analysis of historical volatility and then (so long volatility does not change significantly) fixed for each contract; they are independent of current prices. (See Exhibits V-A, VI-A, and VII above.) Nonetheless, initial margins, even for contracts held over from the previous day, are calculated anew each day because the applicable

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[119] Prior to 1988, clearing members could ask that contracts be settled only when the member requests, rather than daily. This method enabled the member to control the recognition of profits and losses. "Variation margin" was posted under this method. It was seldom used for LIFFE contracts, however, and dropped in 1988. ("Settlement by request" is still extensively used for futures and options on soft goods.)

[120] ICCH Regulation 12d and Procedure 5.4. ICCH's regulations apply only to its clearing members. However, LIFFE requires that each of its members must extract as much margin from its clients as the clearinghouse requires of clearing members. The Sydney Futures Exchange has no such requirement.

margin rate depends on the composition of the member's portfolio.[121] Additional margin may be assessed individual clearing members that have large positions (a) as a percentage of the total number of contracts outstanding, (b) in relation to the member's financial condition, or (c) in the delivery month.[122] However, ICCH has no numerical guidelines for when additional margin should be charged in respect to LIFFE contracts.

All LIFFE contracts are settled daily.[123] This means that ICCH calls from members (a) for the current day's trades, the difference between the original prices and the end-of-day settlement prices[124] and (b) for contracts brought forward, the change between the previous day's settlement prices and the current day's settlement prices. Positions which are not closed out are

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[121] The deposit to be posted by members is the sum of three components. (a) All contracts with the same underlying commodity, but different delivery months are offset. An intra-commodity straddle rate is applied to the offset. (b) After the aforementioned offset, any long and short positions in the various gilt contracts are offset. An inter-commodity or inter-contract straddle rate is applied to this offset. (c) Any contracts not offset are assessed a full initial margin rate. ICCH Procedure 5.4.1. However, clearing members need not pass on the benefits of offset to other members for whom they clear. Thus, clearing members can raise substantial funds for investment by demanding full margin from their customers, while themselves posting only the minimum required by the clearinghouse.

[122] ICCH Procedure 5.4.4. Additional margin is assessed a few times a year under this provision, mainly for large positions in delivery month.

[123] ICCH Regulation 15 and Procedure 5.1.1.

[124] The settlement price, technically called the "official quotation," is determined by ICCH using the settlement or closing price set by the exchange. If ICCH should consider the exchange's price unrepresentative of the market for the underlying commodity, it may set a settlement price that it believes to be appropriate.

re-established the next day, with the prior day's settlement price as the price of the trades. On the day that a contract is closed, the profit or loss is merely the difference between the previous day's settlement and the value created by either (a) the making of opposite contracts which close the position or (b) by a final revaluation against the Exchange Delivery Settlement Price.

ICCH's daily settlement would appear to be economically equivalent to the system of variation margination practiced by many American exchanges. Nonetheless, daily settlement, which is effected by cash transfers, appears to be a simpler method of margination, particularly for a clearinghouse that serves many exchanges in diverse markets.

- Daily settlement credit and debit amounts can be automatically netted for payment purposes across all contracts on all exchanges for which ICCH clears.[125]
- Credit settlement balances are immediately available to member firms, while credit variation margin balances are frequently retained by the clearinghouse.
- Profits and losses are unavoidably realized on settled accounts.
- Daily settlement allows the complete separation of initial margin from the mark-to-market element of margination.
- Daily settlement makes it easier to unwind a contract, should that ever become necessary (see below), because one need unwind back, at most, only one business day.

[125] The offsets do not extend to between house and segregated client accounts, however. Further, there are no offsets between LIFFE and LTOM contracts, as ICCH and LOCH utilize different payments systems.

ICCH maintains positions in the various accounts on either a net or a gross basis; this has no effect on the initial margin or the daily settlement amounts called. All clearing members' house accounts are maintained net. All client accounts, whether segregated or not, are maintained gross. Accounts maintained for non-clearing members may be either net or gross.[126] (When an account is maintained gross, ICCH must be specifically informed of positions that are to be closed. This step would be superfluous when positions are maintained net.)

During the short period when commodities (gilts, U.S. Treasury bonds, German government bonds, or currencies) are being delivered, variation margin is called. This margin is based on the difference between the "exchange delivery settlement price" (EDSP) and successive days' settlement prices while the contracts are still being traded or otherwise between EDSP and an equivalent marked-to-market value determined by ICCH. Credit variation margin, unlike daily settlement amounts, cannot generally be used to offset initial margin requirements.[127] Debit and credit variation margins may be offset across all types of contracts, however, resulting in a single net sum.

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[126] ICCH Procedure 4.3. Accounts maintained net are "settled to market." Accounts maintained gross are "marked to market." This is only a matter of terminology; in both cases, the procedure is the same but for the resultant net or gross positions carried over to the next day.

[127] ICCH Procedure 5.3.2.

In periods of extreme market volatility, ICCH may require additional margin. Such additional margin must be paid to ICCH within one hour of demand by a Town Clearing check (for same-day funds availability), or, if the member chooses, by a special call on its bank account under the Protected Payments System (see below).[128]

Cover for cash debits and margin is due at 10:00 a.m. each day.[129] Margin may be in the form of cash, bank guarantees in any major currency, or U.K. Treasury bills.[130] ICCH looks to collateral already in-house before making demands on members. Where more than one form of cover is available in-house, ICCH utilizes them in the following order: cash in the currency of the contract, other cash currency, U.K. Treasury bills, and bank guarantees.[131] If members' liabilities remain after utilizing in-house collateral, funds are called through the Protected Payments

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[128] ICCH Regulation 12f and Procedure 5.5.4. ICCH may discriminate among individual members. ICCH Procedure 5.4.

[129] LIFFE has no requirements as to when a non-clearing member or customer must post margin with the clearing members, in order that they in turn may pay ICCH. The AFBD requires that segregated customers post initial margin with their brokers before the trade. (AFBD Rule 7.5.1) Brokers must require that any margin liabilities that subsequently arise be paid to them on the next business day. (AFBD Rule 7.5.1) If the customer fails to do so, the broker may close out the position; he must close out if the failure persists for five business days. (AFBD Rule 7.5.2) (These rules do not apply to non-segregated positions.)

[130] ICCH Procedure 5.5.3.

[131] ICCH Procedure 5.10.

System. This is a system of internal transfers at one of several participant banks (Exhibit IX). Clearing members are required to establish "cover accounts" at one of these banks and provide ICCH with a mandate to tap funds therein (Exhibit X).[132] Between 8:15 a.m. and 8:45 a.m.--but no later than 9:00 a.m.--each business day, ICCH, through delivery of computer listings, instructs these banks to transfer amounts due it by the clearing members from the members' accounts to a clearinghouse account.[133] The banks have until 10:00 a.m. to make the transfers and to advise ICCH of any instances wherein payment will not be made.[134] "Subject to any exceptions, the banks will, at 10:00 a.m., be irrevocably committed to credit ICCH with funds for value that day; no partial payments will be made."[135]

Transfers to ICCH through the Protected Payments System are made only once a day (unless an intra-day call occurs). This

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[132] Actually, clearing members must maintain three accounts: cover, current, and tender. The cover account is used for margination, settlements, interest and accommodation charges, ICCH registration fees, and certain other costs. The current account is used for the cost of reports and equipment rentals. The tender account is used for the delivery of commodities. ICCH has access to all three accounts. A separate set of three accounts is maintained for segregated client business. (ICCH Procedure 5.12.)

[133] The clearing members get this information from their Intercom computer screens.

[134] ICCH actually receives a definite answer from the banks in regard to each clearing member. If ICCH does not hear by 10:01 a.m., it starts calling the banks. By 10:30 a.m., all calls will have been made.

[135] ICCH Procedure 5.9.1. This statement does not appear to mean that the banks need commit more than the members have in their accounts. The value date will be the following business day for Deutsche marks and yen.

system is also used to remit surplus cash balances to clearing members' accounts; members must either make prior arrangements for automatic transmission of these balances or else submit to ICCH by 10:30 a.m. their requests for a transfer. ICCH then provides to the banks by 1:00 p.m. instructions to make those transfers for value that day.[136]

Although the PPS banks transfer funds to ICCH at 10:00 a.m., the banks may not actually receive the funds from the clearing members until later in the day. Generally, funds are sent to the banks either by wire (e.g., CHAPS) or by Town Clearing checks for same-day value.

Clearing members, in turn, request margin cover from their customers. The timetable for payment of such margin is soft. For segregated customer accounts, AFBD requires that initial margin be posted before a trade is executed.[137] Customers are to meet subsequent margin calls on the day after the clearinghouse calls it from the clearing members (e.g., trade day plus two), or risk having their positions closed out.[138] Should a customer fail to

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[136] ICCH re-distributes funds among the PPS banks by using Town Clearing checks to transfer funds from surplus accounts to deficit accounts. (This process is undertaken between 12 noon and 2:00 p.m.)

[137] The Association of Futures Brokers and Dealers Ltd., AFBD Rule Book (December 1987), Rule 7.5.1(a).

[138] AFBD Rule 7.7.

meet a margin call on five consecutive business days, his positions must be closed out.[139] The SRO imposes no requirements with respect to non-segregated accounts, where the majority of trading occurs. In practice, clearing members would seek to obtain margin before the close of the payment systems (generally wire transfers, but also London Town Clearing checks or CHIPS payments in the U.S.) on the same day that they themselves must pay ICCH.

U.K. Treasury bills used for cover must have an original time to maturity of 91 days, with at least 30 days remaining.[140] They may be submitted by both clearing and non-clearing members to ICCH's custodian, Barclays Bank plc, by 4:00 p.m. on any business day for use in the following day's cover.[141] Should the member wish to withdraw Treasury bills (or bank guarantees) while in use, it will be allowed if replacement cash is submitted. (There is no deadline for this.) A 5 percent haircut is applied to the nominal value of bills used for collateral.

When U.K. Treasury bills or bank guarantees are used as cover for variation margin or the first tranche of initial margin,

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[139] Such positions not closed out result in a regulatory capital charge for the firm.

[140] ICCH Procedure 5.8.

[141] There is a flat fee of £25 for each lodgment. The amount of Treasury bills lodged, as well as of bank guarantees available, is shown on the members' Intercom display terminals.

ICCH assesses an "accommodation charge."[142] Contrariwise, ICCH pays interest on cash posted for initial margin above the first tranche.[143] ICCH's interest rates are based on a calculated rate for overnight money called the "London deposit rate."[144]

Interest Charges and Credits

Purpose	Accommodation Charges for Noncash Cover	Interest Credits for Cash Cover
Initial margin:		
First tranche	London deposit rate	None
Other	None	London deposit rate
Variation margin:		
Debit	London deposit rate plus 1%	None
Credit	None	London deposit rate less 25 basis points

To reduce potential demands on the Protected Payments System, ICCH encourages members to leave small amounts of surplus cash with it. The clearinghouse pays interest on these deposits

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[142] ICCH Procedure 5.11.2. The first tranche is £50,000, $75,000, DM 50,000, or ¥12 million, according to the currency. To determine which rate is applicable, ICCH covers liabilities in the following order of priority: debit cash balances, variation margins, initial margins, and other liabilities. ICCH Procedure 5.10.

[143] In addition, if cash margin is posted in a currency other than the currency of the contract, an accommodation charge is made for the currency of the contract, offset by interest paid on the posted currency.

[144] The London deposit rate is the average of the bid rates for overnight funds for selected money brokers and banks, as displayed on Reuters, less 25 basis points and rounded to the nearest 1/8 percent. Separate rates are calculated for sterling, dollars, deutschmarks, and yen.

at the London deposit rate less 25 basis points. Because of ICCH's willingness to pay interest, over two-thirds of margin cover is provided by cash. Bank guarantees are the next most frequently used type of collateral. U.K. Treasury bills do not appear to be used much.

Lastly, ICCH may call for payments only at certain intervals or when cash debit balances reach specified levels.[145] The clearinghouse charges interest at the London deposit rate plus 1 percent (plus 2 percent for yen) for any debits not called.

Delivery Procedures

Delivery procedures exist for gilts, U.S. Treasury bonds, German government bunds, and currencies.[146] No special procedures are required for the cash settlement contracts (3-month interest rate, Japanese government bond, and FT-SE 100 index) inasmuch as final settlement is made through the normal daily settlement procedure (utilizing the Protected Payments System) on the morning following the last trading day.[147]

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[145] ICCH Procedure 5.2. ICCH will not call amounts less than 10 pence.

[146] ICCH assesses fees for each lot delivered, e.g., £5 per lot for each party to a gilt contract, £3 per lot for each party to a U.S. Treasury bond contract, and £3 per lot for each party to a currency contract (the last up to a maximum of £240 for all lots). (VAT is added.) A smaller fee of 35 pence per lot plus VAT is charged for all cash settled contracts.

[147] ICCH Procedure 6.6.1. Initial margin continues to be called on settlement day, together with the final settlement amounts, and is not returned until the following day.

Gilts

Gilts may be delivered at seller's choice of any business day in the delivery month. The process normally requires three business days, starting with the day that the seller gives notice of delivery ("Notice Day") and ending with Settlement Day.[148] Notice may not be given more than two business days before the first day of delivery month ("First Notice Day") nor later than the business day between the last trading day and the end of the business month ("Last Notice Day"). When notice is given on the Last Notice Day, two days, not three, are available for the delivery process.[149]

The seller has until 11:00 a.m. to give notice on any Notice Day (10:00 on Last Notice Day). This notice will contain full details of how he intends to make delivery, e.g., whether by utilizing a stock transfer form or the Central Gilts Office (CGO) wire service and the name of the party in which the stock is registered. (Clearly, this party need not be the clearing member himself.) Settlement is at the exchange delivery settlement price, which is determined by LIFFE officials in accordance to the contract terms. Generally, speaking, the EDSP is the average of

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[148] In contrast, according to standard conventions, settlement and delivery of gilts in the cash market takes place the business day after trading.

[149] Because some accounts are maintained on a net basis, a clearing member must notify ICCH if he wants the clearinghouse to make deliveries between sub-accounts that have been netted and thus made invisible to ICCH.

prices made in the pit between 10:59 a.m. and 11:00 a.m. on Notice Day (between 10:59 and 11:00 on the last trading day for the Last Notice Day), weighted by the number of lots traded.[150] LIFFE officially announces this price by approximately 11:30 a.m. each Notice Day.

ICCH allocates gilts to buyers pro-rata to their gross positions on the day before Notice Day.[151] To facilitate this allocation, clearing members are required to advise ICCH of their gross positions by filing a Gross Position Return by 10:00 a.m. every day from the day before First Notice Day to the end of the delivery month. ICCH completes the allocations by the close of business on Notice Day (by 12:00 noon on Last Notice Day) and informs both buyer and seller that same day--but no later than approximately 8:45 the following morning (by 3:00 p.m. on Last Notice Day).[152] The buyer then advises ICCH's LIFFE Market Services Department by 12:00 noon that following day (by 5:30 p.m. on Last Notice Day) how he proposes to receive the gilts (whether by stock transfer form or through the CGO) and the name of the person in

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[150] The contract gives LIFFE officials the right to override the pit prices if, in their opinion, it is not consistent with the cash market values of deliverable stock during the valuation period.

[151] While the numbers of lots is allocated pro-rata to gross positions, the allocation of specific gilt issues to the selected buyers is made randomly.

[152] As allocations are based on positions on the day before Notice Day, the buyer could conceivably have sold his position before receiving notice of his allotment. In this event, the buyer may re-deliver the gilts; this always entails a one-day carry of the stock.

which the gilts are to be registered. This schedule generally gives buyers, wherever they be in the world, at least a full business day in their home country to make arrangements to transfer and pay for the gilts.

The process on Settlement Day varies according to whether ICCH's counterparties have elected to utilize stock transfer forms or the CGO. If a seller chooses the former method, he must deliver a stock transfer form to the ICCH Tenders Department by 10:00 a.m. No single form can show more than £3 million of gilts at face value. The forms must either be accompanied by the gilt-edged certificates or else be certified by ISE, the Bank of England, or CGO. ICCH will pay the seller with a Town Clearing check immediately upon delivery. ICCH then delivers the transfer forms to the CGO by 12:00 noon in order that it will be able to turn around and deliver gilts to the buyer later that day.

Sellers that choose to utilize CGO must input the necessary instructions through a CGO terminal[153] by 10:00 a.m. on Settlement Day. CGO operates an Assured Payments System which is essentially payment against delivery, like Fedwire. However, the amount CGO pays the seller need not be, but invariably is, the amount ICCH owes if that amount exceeds £100,000 and falls outside a "band" of six percent around a reference price determined by CGO. If such is the case, CGO will pay the maximum six percent

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[153] Only CGO members have a terminal.

over or under its reference price; any excess due to the seller would be paid by ICCH through a Town Clearing check or called through the Protected Payments System. ICCH also inputs acceptance information into its own CGO terminal by 12:00 noon, together with any necessary instructions to make deliveries to buyers.

For buyers that wish to utilize the CGO service, gilts will have been transferred into their accounts by 1:15 p.m. (assuming the seller delivered as scheduled). The buying clearing members have until 1:30 p.m. to input acceptance instructions and to have the gilts transferred to another member, if desired. The usual restrictions on CGO's assured payments hold; if the amount due the buyer exceeds £100,000 and lies outside the six percent band around CGO's reference price, the difference is paid by ICCH through a Town Clearing check or called through the Protected Payments System.

It should be noted that whenever a buyer elects to use the CGO service, ICCH incurs payments system risk from 10:00 a.m., when it pays the seller (whether through CGO or by Town Clearing check), until 1:15 p.m., when CGO transfers the gilts into the buyer's account against assured payment.

Buyers that elect to receive transfer forms may collect them from ICCH between 1:50 p.m. and 5:00 p.m. These buyers will have paid ICCH earlier that day through the standard 10:00 a.m. transfer in the Protected Payments System. The buyers thus are

exposed to ICCH for the period between their payment and the delivery of the gilts; but ICCH itself faces essentially no settlement risk.

During the entire delivery process, ICCH retains initial and variation margin. Among other things, such margin adds to the protection afforded by the gilt collateral during a CEO delivery versus payment process. As is the practice for all contracts, these margins are not released until the day following Settlement Day.[154]

U.S. Treasury Bonds

LIFFE and CBOT have harmonized the delivery timetables for the U.S. Treasury bond so that, from a delivery viewpoint, trading in either London or Chicago would have minimal advantage over trading in the other locale. Most deadlines in the ICCH delivery process are with reference to Chicago hours, as settlement takes place there. (See Exhibit XI for a schedule expressed in both time zones.) To facilitate the delivery process during Chicago's daylight hours, clearing members are allowed to appoint agents in U.S. to receive and deliver notices on their behalf. Such agents must be either a corporate affiliate of the clearing member or another LIFFE clearing member. The notices are always

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[154] ICCH Procedure 6.2.3.

transmitted to or from ICCH in London--even in the middle of London's night.

Sellers select the day of delivery by giving notice to ICCH by 8:00 p.m. Chicago time (usually 2:00 a.m. London time) two business days in advance.[155] The day on which notice is presented is called Position Day. (In contrast to the procedure for gilts, the exchange delivery settlement price will have been announced by 2:30 p.m. Chicago time, before notice is due.) Working in the wee morning hours, ICCH allocates deliveries to buyers, with the oldest position being allocated first, then the next oldest, and so on until all lots to be delivered are consumed. In order that the clearinghouse may do this, it requires the clearing members to advise it of their gross positions and the dates the positions were established every day during the delivery month.[156]

The buyers are informed of their allocation by 8:15 a.m. London time. As this is the moment that the U.S. Treasury bond futures contract starts trading, buyers in London are not likely to be caught in unwanted open positions. (Buyers in Sydney will

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[155] When there is positive carry (which is usually the case in the U.S.), the holders of bonds have an incentive to defer delivery to the end of the delivery month. Hence, notice of delivery might not be given until a few days after trading ceases. (The last trading day is the seventh CBOT working day prior to the last CBOT working day in delivery month, provided that the last trading day is a day on which the markets in London and the banks in Chicago and New York are open. Otherwise, the last trading day is one business day earlier.)

[156] A failure of a clearing member to so report would result in its positions being allocated randomly. The failure would also be reported to LIFFE's Market Supervision Department.

not be so lucky--see below.) Now it is "Notice of Intention Day."[157] Nearly twelve hours later in the day, when it is 2:00 p.m. in Chicago, the seller advises ICCH of the specific bonds to be delivered ("Seller's Nomination Notice") and the buyer gives the name and address of the bank nominated to receive the bonds ("Buyer's Delivery Details").[158] These banks must be members of the Federal Reserve System and have on-line access to Fedwire. ICCH transmits the information received from each party to the other by 2:45 p.m. Chicago time.

On the third day, Delivery Day, the securities are transferred against payment on Fedwire through one of ICCH's agent banks: National Westminster Bank plc. New York and Barclays Bank plc. New York. The transfers can be made only to or from the clearing members' own accounts, not those of clients or non-clearing members. The deadlines for these transfers are 10:00 a.m. Chicago time for the seller's Federal Reserve Bank and 1:00 p.m. for ICCH's bank. ICCH's agent thus incurs a daylight overdraft lasting up to three hours.

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[157] The processing schedule for Notice of Intention Day will proceed if it is a market day in London, even if banks in Chicago and New York are closed.

[158] The bonds must have remaining maturity of at least 15 years, pay interest semi-annually, and be wireable.

Bunds

The German government bunds are deliverable on one preset day in each quarterly cycle. The delivery process consumes six days, starting with the last trading day. On the last trading day, which is always a Frankfurt working day[159] when LIFFE is open, trading ceases at 11:00 a.m. Frankfurt time (10:00 a.m. London time). LIFFE announces the exchange delivery settlement price within the next half hour. By 12 noon London time, clearing members submit the final gross open position statements to ICCH in preparation for delivery. (The members will have submitted these statements for the previous ten market days as well.) The sellers also submit delivery notices at this time, identifying the bunds to be delivered and the banks to be used. ICCH randomly assigns the bunds to the buyers and, by 3:00 p.m., advises both buyer and seller of the delivery details from its perspective. The day's advisories are completed at 4:00 p.m., when the buyer notifies ICCH of the name of its bank and its account number.

By 11:00 a.m. the next business day,[160] the sellers confirm to ICCH that the bunds are available for delivery against payment. By the same time on the third business day, the sellers confirm that their delivery banks have instructed the Kassenverein

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[159] A Frankfurt working day is a day when the Frankfurter Kassenverein and the prime banks in Frankfurt are open for business.

[160] A business day is a Frankfurt working day that is also a market day.

to transfer the bunds on Delivery Day. At the same time on Day 3, the buyers confirm that payment for the bunds will be made on Delivery Day. On Day 4, Delivery Day, the seller's bank transfers the bunds "against payment" by 8:00 a.m. (Frankfurt time); however, the process is such that his bank may not receive payment until 12:30 p.m. Payment from the buyer is also made by 12:30 p.m. on delivery day. The buyer does not actually receive the bunds until 8:00 a.m. on Day 6, however. In this instance, the transfer is made free of payment. In all these transactions, ICCH's Frankfurter Kassenverein bank is J.P. Morgan GmbH.

Currencies

Approximately one percent of currency contracts result in delivery.[161] Delivery for currencies consumes three days, commencing with the last trading day and ending on delivery (or settlement) day.

For currencies other than sterling, ICCH's counterparties have a choice of two methods for remitting currencies and payments to the clearinghouse: cash or delivery vs. payment (DVP). ICCH faces payments system risk or intra-day credit exposure to banks when the DVP method is used, but no such risks when the cash method is used. For pounds sterling, funds flow on Settlement Day into ICCH via the Protected Payments System and out of ICCH via either

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[161] Nancy H. Rothstein and James M. Little, The Handbook of Financial Futures (New York, McGraw-Hill, 1984), p. 92.

a Town Clearing check or a reverse Protected Payments System transaction.

For all currency contracts, LIFFE announces the exchange delivery settlement price at 11:00 a.m. on the last trading day. Members with open positions at close of trading must give a delivery notice, selecting the payments method and identifying their agent banks, by 12:00. ICCH promptly allocates buyers and sellers. (This allocation is done in case of default by some party. Normally, the parties are not informed of their allocated counterparties.)

When the cash method is selected, the parties due to remit Deutsche marks, Swiss francs, and Japanese yen[162] must make arrangements to deliver the respective currency to the correspondent of ICCH's agent bank, First National Bank of Chicago, London branch, by 10:00 a.m. local time on Day 2 in the currency's home country. These correspondents are:

- In Frankfurt, Swiss Bank Corporation
- In Zurich, Union Bank of Switzerland
- In Tokyo, Bank of Tokyo

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[162] These parties are the "buyers" in the case of the dollar/mark contract and the "sellers" in al other non-sterling contracts.

Parties due to remit dollars[163] must move earlier; they must have the dollars sent via CHIPS before its 4:30 p.m. close on Day 1 in New York. In this case, the CHIPS payment is made to National Westminster Bank PLC, New York, for the account of its parent in London. In all cases, ICCH's agent bank will notify the clearinghouse on the morning of Day 2 whether the counterparties have in fact made the scheduled payments. (ICCH passes on to the parties the interest received on these funds from the time of clearing to the time of settlement.)

Members electing the DVP method must arrange for their bank to telex an undertaking to ICCH's agent bank, First National Bank of Chicago, London Branch, by 11:00 a.m. London time on Day 2. This undertaking constitutes an irrevocable commitment that the funds will be paid by 10:00 a.m. local time on settlement day. (See Exhibit XII for a sample undertaking.)

Assuming that both buyers and sellers have made their contracted payments, on the afternoon of Day 2 ICCH will instruct First National Bank of Chicago, London Branch, to have its correspondents make payment of Deutsche marks, Swiss francs, and yen in the respective financial capitals on Day 3. On Day 3 it will also instruct its bank in New York, First Chicago International, New York Branch, to make payment of dollars on CHIPS to

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[163] These parties are the "sellers" in the case of the dollar/mark contract and the "buyers" in all other contracts.

the appropriate counterparties.[164] (National Westminster Bank will have transferred the dollars it holds to First Chicago International on this day. ICCH uses these two banks so as not to be totally reliant on just one of them for the entire delivery period.)

Procedures in Case of Default

The clearinghouse expects clearing members to absorb any losses resulting from defaults by clients or other members for whom they clear. This is inevitable, given the process of novation described earlier. Henceforth we focus on the circumstances where the clearing member himself defaults.

Both the exchange contracts and ICCH regulations specify events that constitute default. A contract may list the following events:[165]

- failure to fulfil the terms of the contract, the rules of the exchange, or the administrative procedures established for the contract;
- failure to pay any sum due to the clearinghouse by the time specified in the administrative procedures;
- if there is a discrepancy between what a seller has stated he will deliver and what he actually delivers, aside from obvious clerical errors that can be readily rectified; or
- "in the reasonable opinion of the Clearing House he is otherwise in default."

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[164] Under old procedures, which may or may not still be applicable, ICCH's instructions could come as late as 5:30 p.m. London time (12:30 p.m. New York time), leaving four hours to make delivery before CHIPS closes.

[165] These terms are taken from the long gilt futures contract.

The regulations are broader; they enumerate sixteen possible events constituting default, including breach of the exchange's rules, breach of the clearinghouse's regulations and procedures, bankruptcy, and the loss of an exchange membership.[166]

The exchange and clearinghouse have broad discretion in handling defaults.[167] As a first resort, ICCH would seek to have the issues resolved amicably. Failing an amiable settlement, ICCH's staff must refer the issue to LIFFE's Board. The Board then must decide whether or not the issue is of "minor significance." If it is, then the Board will impose its terms on the counterparties. (The parties in this instance reserve the right to submit the matter to arbitration.) Otherwise, the Board, in consultation with the clearinghouse, shall order the positions unwound. Simultaneously, the clearinghouse may in its sole discretion take any steps, including liquidation of the contracts, to protect itself or the counterparty not in default.

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[166] ICCH Regulation 25a.

[167] ICCH has to make a determination that a default exists before its guarantee comes into play. Technical problems do not warrant declaring default. Specific cases can be ambiguous. For example, in 1986 some sellers of U.S. Treasury bond futures were unable to deliver on time because they expected delivery of bonds from offsetting contracts on the Chicago Board of Trade and delivery on Fedwire was delayed. Although it was not clear that the delay over Fedwire was beyond the members' control, ICCH determined this to be a "technical" problem and was criticized for its decision. "LIFFE Investigates U.S. T-Bond Delivery Problems," International Financing Review, no. 627 (June 21, 1986), p. 1863.

There are various ways in which the positions held by the defaulting member can be liquidated.[168] The clearinghouse can execute new contracts in the member's name that would close out open positions. It can transfer the positions to another member. It can make or receive deliveries in final settlement of the contracts. Alternatively, in the case of bankruptcy, ICCH can select another member, holding a contract identical to one held by the defaulting party (but being on the opposite side of the trade) and close out the matched contracts of the defaulting and the selected members. In the last instance, the assigned counterparty in a delivery situation loses his right to receive or make delivery (as the case may be); he receives only cash compensation from the clearinghouse in fulfillment of its guarantee.[169]

Should the Board decide to unwind the defaulting member's trades, his positions would be invoiced back to him at a price set by the exchange, while all members holding opposing contracts (not just the assigned counterparty) would be invoiced back the counterparty's position in proportion to the number of net positions they have outstanding, rounded to the nearest number of

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[168] ICCH Regulation 25b.

[169] If the business of the defaulting member is being wound up, this is the only alternative open to ICCH and will be executed automatically. ICCH Regulation 25cii. The treatment of the counterparty is not as harsh as the description sounds. If the counterparty wants to make or receive a delivery, he is advised to go into the cash market for his needs. ICCH will pick up the counterparty's costs.

whole lots.[170] The exchange's selection of a price for invoicing back is not subject to arbitration.

In certain emergency situations, contracts must be unwound. These situations include war; the imposition, variation, or removal of government controls; and situations wherein the European Economic Community or any institution thereof takes any step that affects the normal course of business.[171] Contracts may also be unwound in cases where a seller's complete performance in delivery becomes impossible[172] and in cases of force majeure.[173] Force majeure specifically include not only acts of God, fire, flood, and labor disputes, but also any reduction in the availability of computer or data processing facilities and bank transfer wires.

Trading in Sydney

The clearing of the Eurodollar interest rate and U.S. Treasury bond futures contracts traded on SFE parallels that of the same contracts traded on LIFFE. These contracts may be traded only

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[170] ICCH Regulation 28b.

[171] ICCH Regulation 26b.

[172] ICCH Regulation 26c. This provision applies only to futures, not to options contracts. ICCH Regulation 26a.

[173] ICCH Regulation 27.

by SFE floor members who are themselves ICCH clearing members or who have a clearing agreement with a ICCH general clearing member.[174] The clearing member guarantees the performance of the SFE member for whom it clears for as long as the original SFE contract shall be out-standing.[175] Floor members must provide SFE with data for matching and allocation of contracts by 8:00 p.m. Sydney time (9:00 a.m. London time in the winter or 11:00 a.m. in the summer), two hours after the cessation of trading.[176] Matched trades are reported to ICCH in London, where they become available on clearing members' Intercom terminals around noon in the winter or 2:00 p.m. in the summer. Members have the opportunity to re-allocate trades in London via Intercom, just as for LIFFE trades. At this point, the trades are specifically earmarked as SFE trades to aid in identifying them. Confirmation of the trades and allocation must be completed by 2:00 p.m.; any trades not confirmed default to the clearing member from whom the allocation is made. There are no facilities to correct any trade details sent to London from Sydney; such data, except for allocations, are final as transmitted.

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[174] The rules of LIFFE recognize the possibility that the SFE member may not have a clearing agreement. However, ICCH will not clear trades unless they are for its members.

[175] LIFFE Rule 8.3.1.

[176] The allocations made in Sydney may well be to London firms.

Once the allocation/confirmation process is completed, the original SFE contracts are discharged by novation. Each original SFE contract, not initially made on behalf of the clearing member that acknowledges it, is replaced by a "parallel LIFFE contract" between the SFE member and his clearing member and a "related LIFFE contract" between the clearing member and the original counterparty, his clearing member, or another member to whom the contract is allocated.[177] At this point, the LIFFE contracts derived from trading in Sydney are indistinguishable from other LIFFE contracts traded in London.

The clearing members post margin and arrange for delivery in the same manner and on the same timetable as any other LIFFE contract. The time between a trade and the posting of initial margin thus is 9 to 11 hours longer when the trade occurs in Sydney than when it occurs in London. The clearing member has all of the next business day in Sydney, if necessary, to collect funds to meet ICCH's 10:00 a.m. deadline for posting of margin in London. However, funds due from ICCH to the member on any business day in London cannot be passed through to the floor member in Sydney until the next business day down under.[178]

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[177] LIFFE Rules 8.4.1 and 8.4.2. The clearing member must acknowledge the original SFE contract for novation to become effective; he is obliged to so acknowledge. LIFFE Rule 8.4.6.

[178] Intraday margin calls would be made during the London, not the Sydney, trading day. Such calls would be made of clearing members based in London. In this situation, the clearing members would have no choice but to make overnight loans to the SFE members back in Sydney.

Delivery on the Eurodollar contract should present no unusual problems inasmuch as settlement is effected at a precisely known moment during each delivery cycle. Such is not the case with the U.S. Treasury bond contract, which can be delivered on any business day during the delivery month. Delivery notes presented in London are allocated to buyers on the basis of their positions at the end of notice day. While these notices are due at ICCH by 7:00 p.m. London time (6:00 a.m. Sydney time), ICCH does not make allocations until the following 8:15 a.m. London time or 7:15 p.m. Sydney time--after another day of trading in Sydney has elapsed. Thus, a trader who has sold his position in Sydney may nonetheless be obliged to take delivery, based on his previous day's position, ending up with an unexpected long bond position and short futures position. To close out these positions, he would have to take one of two actions:

- give notice to deliver on his new futures contract. He would need to finance the bonds for one day between receipt and delivery.
- buy a new futures contract to close out the short futures position and sell the bond immediately upon receipt. No financing is required, but payments system risk is heightened due to the proximity of the securities transfers.

Either way, the SFE trader subject to a delivery notice would be exposed to at least one day's market risk.

Adequacy of Margins

Initial margin is meant to protect the clearing-house from loss during the delivery process. Prior to delivery, initial margin also protects the clearinghouse from any default by a

clearing member (e.g., failure to post mark-to-market payments) which conceivably could foretell default on delivery in due course. Thus, one must judge the adequacy of margins against potential market movements both prior to and during the delivery process.[179]

ICCH normally sets initial margins large enough to cover a one-day fluctuation in the price of the underlying most of the time. This would enable the clearinghouse, if a default occurred, to liquidate the contract, if it is still trading, without loss to itself. If the contract is not trading, ICCH may want to go to the market to acquire or sell the commodity in order to meet its obligations to the non-defaulting member on the other side of the transaction. Delivery times extending beyond one day pose commensurably greater risk that the market will move far from the delivery settlement price. In this context, the initial margins for futures on LIFFE appear reasonable, although we lack volatility data to make a proper confirmation.[180]

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[179] ICCH margins the delivery period specially. Futures contracts are assessed full margin rates, rather than the lower straddle margin rates, in spot month. Further, ICCH pays particular attention to the spot month in assessing additional margin above the published margin rates.

[180] The margins appear "reasonable" from the viewpoint of protecting the exchange. Other criteria, e.g., the amount of leverage the government considers permissible for investors and inter-market linkages, may suggest different margin levels.

Futures	Days to Deliver	Initial Margin a/ (basis points)
3 month sterling	1	40
3 month Eurodollar	1	20
Short gilt	2 or 3	100
Medium gilt	2 or 3	150
Long gilt	2 or 3	200
U.S. Treasury bond	3	200
JGB	1	100
German bund	6	100
Pound/dollar	3	165
Deutschmark/dollar	3	141
Dollar/mark	3	142
Swiss franc/dollar	3	118
Yen/dollar	3	99
FT-SE 100	1	567

a/ At full rate. Based on prices for currencies and the FT-SE 100 on December 15, 1988.

VI. Clearinghouse Operations for LIFFE Options

ICCH operations for LIFFE options are similar to those for futures. To that extent, they were described in the previous section. The matching of trades is done through LIFFE's Trade Registration System. The margination for options is integrated with that for futures, unlike the margination for most other options exchanges in the world. Even exercise, particular to options, is integrated into the futures delivery process by the creation of special "delivery contracts."

Margination

LIFFE and ICCH have jointly developed a new margination technique for options that enables options positions to be offset by futures positions. The technique utilizes initial margins and daily settlement. Initial margins are based on several principles:

- The options premium is not payable in full by the buyer upon purchase, but is subject to the same type of margin as exists for futures, e.g., initial margin and daily settlement.

- The amount of initial margin for the buyer of a single option contract is a fraction (varying between zero and one) of the initial margin for the corresponding futures contract. This fraction is called the risk or delta factor. The margin, from the buyer's perspective, represents a good-faith deposit that the full premium will be paid when the option expires or is exercised.[181]

- The amount of initial margin for the seller of a single contract is composed of two parts: the margin that is also charged the buyer (the delta component) plus an additional amount in consideration of the seller's obligation to deliver the underlying security or commodity if the option is exercised.

The risk factors are calculated daily for each contract and are based on the exercise price, the price and volatility of the underlying, and the time to expiry. They utilize the delta, a proportionate measure of the percentage variation in the option premium for a given percentage variation in the price of the underlying instrument.[182] When an option is far out-of-the-money,[183]

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[181] From the clearinghouse's perspective, margin is just one day's maximum price movement in case it has to close out a defaulting member's position.

[182] LIFFE's delta mechanism is different from the delta-based system at the Chicago Mercantile Exchange and the New York Futures Exchange. At the U.S. exchanges, the initial margin is the sum of the premium and a risk factor, while at LIFFE it is some other function of the premium and the delta.

the risk factor is close to zero, and the initial margin is minimal. When an option is deeply in-the-money,[184] the risk factor is close to one, and the initial margin is nearly the same as that for futures. There is no relationship between the amount of initial margin and the premium, except that the premium serves as a limit on the amount of margin that may be called from buyers.

The additional margin for short positions is calculated daily from a "risk matrix" and provides the clearinghouse with cover sufficient for an adverse movement in the price of the underlying during a trading day.

The calculation of initial margins requires several steps. Generally speaking, positions in futures and options can be offset against one another, thereby reducing the total cash margin that clearing members must post.

- Long and short positions are first offset within each option type (call or put) and maturity class. Each resulting net position is weighted by its risk factor (which depends on the option type and strike price). Then all options for a given maturity month are combined into a net position (Exhibit XIII-A).

- The net options positions are offset by futures positions for the same month. The trades offset are assessed an intra-month spread rate ("A" in Exhibit XIII-B).[185]

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[183] The price of the underlying is below (for calls) or above (for puts) the strike price, rendering exercise of the option financially unjustified.

[184] The price of the underlying is above (for calls) or below (for puts) the strike price.

[185] The intra-month spread rate is zero for futures options. There is no relationship between this rate and other margin rates for non-futures options.

- The remaining futures/options positions that can be offset by positions in other delivery/expiry months are assessed an inter-month spread rate ("B" in the attachment).

- Any remaining net positions are assessed a full margin rate ("C" in the attachment).

- Net short options positions for each option type, month, and strike price are also assessed additional margin from the risk matrix ("D" in the attachment).

- Certain combinations of options result in a synthetic futures position. If the margin as calculated above exceeds the margin that would be charged on the equivalent real futures position, a credit will be given to reduce the margin to the amount that would be due on the future ("E" in the attachment).

- If the above calculations result in an initial margin for long positions in excess of the current premium, a credit will be given to reduce the margin to the amount of the premium ("F" in the attachment).

Because the delta and risk matrix change every day as the premium changes, the initial margin required by the clearinghouse for options (unlike that for futures) also changes each day.

Separately, positions are marked to market each day through daily settlement. This means that as the premium increases, the writer of the option pays funds to ICCH, while the buyer receives funds. This is because ICCH is obliged to the buyer if he should exercise the option. If the seller should default, ICCH possibly would go into the market to purchase a substitute option. The daily settlement amount paid by the seller, together with the initial margin, assures ICCH that it will be able to do this without suffering a loss. Similarly, as the premium declines, the buyer of the option pays funds to the clearinghouse, while the seller receives funds. The premium could decline, for example, as

expiration day approaches and the time value of the option approaches zero. In the extreme case, if the option expires worthless, ICCH will be obliged to pay the full amount of the premium to the seller. It is unlikely to suffer any loss even if the buyer defaults, for the buyer will have--through the mark-to-mark feature--gradually paid over the full premium.

Summarizing, after positions are established, the amounts due to or from ICCH each day are comprised of two components: the change in initial margin and the mark-to-market amount. For sellers the two components move in parallel; the seller always owes the clearinghouse when the premium rises. For buyers the two components move in opposite directions. Thus the daily funds flows with respect to the buyer are smaller than those with respect to the seller. Further, ICCH's exposure is no different on options than it is on futures.

Exercise

A holder of a option may exercise it by 5:00 p.m. on any business day.[186] Exercise is accomplished by one of two methods:

-- by submitting an exercise notice for any option before the month of expiry or for at-the-money or out-of-the-money options in expiry month[187] or

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[186] On the last trading day, the deadline is 6:00 p.m. in the case of the long gilt and 8:30 p.m. (2:30 p.m. Chicago time) in the case of the U.S. Treasury bond.

[187] For the long gilt and U.S. Treasury bond options, which expire in the month before the futures delivery month, the "expiry" month in this context is the calendar month before the delivery month.

-- through the computer system Intercom for in-the-money options in expiry month.

ICCH randomly assigns the exercised contracts to sellers based on their gross positions. (Sub-accounts are treated as separate accounts.) The selected sellers learn about the assignments at 7:30 the next morning by studying the Member Registration Statement and Option Position Summary that are prepared daily, showing the result of all the previous day's activity. No special options exercise or assignment notices are prepared.[188]

In-the-money sterling and Eurodollar interest rate contracts are automatically exercised by ICCH upon expiry.[189] Other in-the-money contracts are not automatically exercised unless the member leaves standing orders with ICCH to exercise them. These orders must involve all types of options (other than sterling and Eurodollar interest rate options) and not just selected types. Even then, ICCH will not automatically exercise certain series that are just in-the-money, but only those that are at least a specified distance away from at-the-money.

In the case of futures options, a futures contract is established by the start of trading on the day after exercise. The process is the same as if a trade had been made at the option's

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[188] An exception is made for dollar/mark contracts that are exercised on expiry day. Because these contracts have a shorter delivery period than other options, ICCH will telex exercise information to members by 12:00 noon on that day.

[189] Members may instruct ICCH not to exercise automatically an option.

strike price on the day of exercise. In accordance with normal procedures, the "trade" is immediately settled or marked to market, and initial futures margin is called from both parties. Simultaneously, the options positions are closed out and the options deposits are returned to both parties. The buyer pays the seller, through the clearinghouse, the original premium or that part of the original premium outstanding.

When a currency option is exercised, a "delivery futures" contract is created on the following day.[190] The standard process for delivering currencies begins on that day and ends on the third day after the exercise of the option. During the delivery period, initial and variation margin are called on the delivery futures contract, just as they would be on any other futures contract.

VII. LOCH Operations

LOCH is a subsidiary of ISE that is managed by a subsidiary of ICCH. As a subsidiary of ISE, it has its own rules and procedures that differ significantly from those used by ICCH. Most operations are performed in the Stock Exchange's building, but use ICCH's computers. For certain contracts--options on currencies--the clearing only is done by LOCH, while margination, guarantee, and delivery are handled by ICCH proper.

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[190] Except when the dollar/mark contract is exercised on expiry day; then a delivery futures contract is immediately established.

At one time, the ISE-LOCH clearing and settlement systems were considered deficient, adding to members' costs.[191] Trade comparison operations have since been improved with new systems, but margination remains somewhat inefficient, as will be apparent below.

Clearing

This sub-section describes operations as of 1988. LTOM plans to install a new trade matching system, similar to LIFFE's TRS, in 1989.

Dealing slips are prepared in quadruple and time-stamped on the trading floor. One copy is put in a collection box for pick-up and entry into a traded options matching system (TOMS), based on IBM personal computers.[192] The system matches trades on the basis of the option specifications, the number of contracts, the premium, and the counterparties. Five times a day, at two hour intervals, matched and unmatched trade reports are produced and distributed to clearing members.[193]

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[191] "Listed Options: A Survey of Trading Costs Outside the U.S.," International Financing Review, no. 646 (November 1, 1986), p. 3301.

[192] TOMS was introduced in January 1987.

[193] The fifth and final set of reports is produced at 8:00 p.m.

Clearing members are responsible for reviewing the trade reports and making revisions where the reports do not match or where account details are missing or incorrect.[194] Trades can also be "given up" to clearing members other than oneself or one's own. Adjustments are made through submission of paper forms to ISE. The clearing members have until approximately 5:30 p.m.--which can be extended until approximately 7:30 p.m. on busy days--to submit corrections to be reflected in the final reports for matched and unmatched trades to be produced that day.[195] If they miss the deadline, they still can submit adjustments the next business day. Trades still unmatched at the end of the second day are submitted to the board dealer for adjudication. (An important exception is expiry day, when all unmatched bargains have to be resolved. If for any reason they cannot be resolved that day, the trades are deleted from the computer system and members will have to make any financial adjustments between themselves.[196])

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[194] The London Option Clearing House, Clearing Manual, Sections 1.5.2, 1.5.3, and 1.7. Hereafter cited as "LOCH Manual." A properly prepared report would specify whether the trade is for the firm's account or a client account and whether the trade is to open a position or to close a position. (Failure to close a position results in double the intended positions.)

[195] LOCH Manual, Section 1.7.6.

[196] LOCH Manual, Section 1.6.4.

Matched trades are sent to LOCH, where they are registered. By 8:00 a.m. the next business day, LOCH will have produced an Accepted Bargain and Position Report for each member of the exchange; these reports are distributed to non-clearing members through their clearing agents. Corrections may be made for errors found on these reports, but on this day the corrections are sent to LOCH (by 6:30 p.m.) rather than to ISE's trade matching system.[197] (These corrections involve assignment to the firm's account vs. client's account and open vs. close instructions. The latter are particularly important on expiry days, as they affect assignments and the right to exercise an option. Neither ISE nor LOCH will accept liability for errors here.[198])

LOCH's guaranty of contracts is effected by novation. As is the case with ICCH, the novation process has only recently been officially established in writing.

Margination

Margin requirements are calculated daily.[199] There is only one type of margin; accordingly, the terms "initial margin" and "variation margin" are not used. The requirements for market-

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[197] LOCH Manual, Section 2.6.3.

[198] LOCH Manual, Section 2.5.4(i).

[199] LOCH Manual, Section 3.1.

makers are different from those for broker-dealers. Clearing agents that clear for both types of non-clearing members have to prepare two separate margin reports.

Margin for broker-dealers is calculated according to a complex set of rules. In summary, these rules require:

- Positions maintained for an exchange member's own account are maintained on a net basis (longs less shorts), while positions maintained for client accounts are maintained on a gross basis.[200]
- The clearinghouse calculates margin on reported positions assuming that the positions are all uncovered.
- Clearing members may request a reduction in margin levels to reflect cross-coverage of positions.

In all cases, margin is imposed on writers of options only (the shorts). Buyers (the longs) meet their obligation in full by paying premiums.

Margin on uncovered positions is based on a percentage of the value of the underlying security or currency, plus an in-the-money element or minus an out-of-the-money element. The applicable rates are 8 percent for currency options and 12.5 percent for the FT-SE 100 index option.[201] The in- and out-of-the-money elements are the full economic value of the contract's being in or out of the money.

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[200] Ibid.

[201] For equity options the rate is 20 percent.

Clearing members may claim one of two "concessions" from the margin requirements for uncovered positions.

> **The spread.** Long positions in either calls or puts may be used to offset short positions for the same underlying, provided that the expiry date of the long series is the same as or later than that of the short series.[202]
>
> **The straddle or combination.** Where an investor is short both calls and puts in the same underlying, the lower of the two margin requirements (for the calls and for the puts) is ignored.[203]

In both cases, the concessions are to be based on positions maintained by individual clients of the clearer.[204] As LOCH itself has no knowledge of the positions of individual clients, the clearing members are trusted to observe this rule.

To obtain these concessions, the clearing member or agent must submit appropriate forms to LOCH by 6:30 p.m. each business day.[205] The clearing member is also responsible for notifying

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[202] LOCH Manual, Section 3.6.2. Where the exercise price of a long call (put) is equal to or less than (greater than) the exercise price of the short call (put), the long position fully offsets the short. Otherwise, margin is limited to the difference between the two exercise prices. Thus, spreading effectively reduces gross positions in a particular options series to net positions for the purpose of margin calculation.

[203] LOCH Manual, Section 3.11. The expiry dates are irrelevant here.

[204] LOCH Manual, Sections 3.6.2 and 3.11.1.

[205] LOCH Manual, Sections 3.7.1 and 3.12. In practice, the firms may use their OSCAR computer system to calculate the margins automatically and input the results to the LOCH/ICCH computers.

LOCH if a concession should be withdrawn as a result of subsequent trading.[206]

Margins for market-makers are based on the premise that these persons would prefer to close out their positions before expiry and not to be involved in exercise and delivery. Accordingly, margins are based on percentages of the options premium, not the underlying security or currency. The calculations boil down to the following steps:[207]

- Long and short positions in the same options series are netted.
- Debit margins with respect to series wherein the market-maker is net short are computed at 130 percent of the closing best offer. Presently, the 130 percent rate applies to all types of options.
- When a market-maker is net long in one series and net short in another series within the same class of options (same type of option and underlying), credit of 100 percent of the long positions (70 percent for currency options) is given against the short positions within the class.
- If debits and credits remain, credit of 50 percent of the long positions in one class (35 percent for currency options) is given against the short positions in other classes, provided that the member is registered to make markets in those particular options.
- Credits are not allowed from the day before expiry day.
- The market-maker (or his clearing agent) posts with LOCH the excess of aggregate debits over aggregate credits.

In addition to margin as thus calculated, market-makers would have to post the full premiums for all net long positions.

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[206] Only in obvious situations, based on the limited data available to LOCH, will LOCH reduce concessions automatically. LOCH Manual, Sections 3.7.2 and 3.11.6.

[207] LOCH Manual, Section 3.16.

Margin is due at the clearinghouse at 10:00 a.m. each business day. (Customers must pay their clearing member by 9:45 a.m.[208]) In the case of options on the stock index and equities, the margin is paid to LOCH; in the case of options on currencies, margin is paid to ICCH. It may be posted in any combination of cash, securities, and bank guarantees in any of three currencies: the pound, dollar, and French franc.[209] (Premiums must be paid in cash.[210])

The overwhelming majority of margin cover on LOCH consists of securities. A wide range of securities may be pledged: selected British and French equities, U.K. Treasury bills, British funds, corporate and municipal bonds, U.S. government securities, and American depository receipts.[211] Certain bank certificates of deposit may also be used.[212] In practice, the majority of the collateral consists of U.K. Treasury issues. As these are physical

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[208] LTOM Manual, Section VIII, Appendix.

[209] LOCH Manual, Section 8.2. French francs are accepted because LOCH has made arrangements with French banks in connection with its clearing of options on French equities.

[210] LOCH Manual, Section 8.4.1.

[211] LOCH Manual, Section 8.9.

[212] All the equities are subject to a 20 percent haircut. The fixed-income instruments are discounted 2 to 10 percent, depending on maturity. A further 5 percent discount is applied if collateral in one currency is used to cover margin in a different currency. LOCH Manual, Section 8.10.

securities, they are delivered to a bank depository, which may be any branch of one of approximately 60 approved banks, including eight American banks, or one of the clearing banks (Exhibit XIV). The collateral may even be lodged by the ultimate investor directly into LOCH's account at one of these banks. The client notifies his broker, his broker's agent, and LOCH of a lodgement by sending each (through the chain of relationships) a copy of the pledge form that he gives to the bank. The bank, in turn, notifies the clearing agent and LOCH that it has received the securities. (The procedure is similar, but more complicated, in the case of French securities.) There is no deadline for lodgements; timeframes depend on the (daytime) operating hours of the depositories, although it is obvious that securities have to be lodged the day before margin is due in order to avoid a clearinghouse call for cash margin.

Collateral is not actually put in use, however, until the clearing member lodges a stock utilization form with LOCH by 10:00 a.m. on the day the collateral is needed. This form, a three-dimensional matrix, advises LOCH exactly how much of each of:

cash (sterling)
cash (dollars)
cash (French francs)
securities held in an ISE
  settlement (TALISMAN) account
other British securities
American securities
French securities
bank guarantees

would be used to satisfy each of nine margin requirements: for market-maker, firm, and client accounts in sterling, dollars, and French francs. This form has to be filed anew every day. Only if no securities are pledged to LOCH and margin is covered totally by cash or bank guarantees are members excused from filing a collateral utilization form.[213]

Guarantees from any number of the approved banks (the same ones approved as depositories for securities--see Exhibit XIV) are be used to cover a small portion of margin requirements (Exhibit XV).[214] Unlike in the case of securities collateral, LOCH will not accept guarantees for a client passed on by a clearing member. Further, LOCH will not release a bank from its guarantee if it is needed for margin purposes, e.g., not until the member posts adequate cash or other collateral to cover his liability.

The residual margin liability is paid in cash.[215] Cash in British pounds must be paid by a Town Clearing cheque, good for same-day value. These cheques are physically delivered to LOCH. Cash in French francs may be posted in several ways, most of them

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213 LOCH Manual, Sections 8.13 and 8.14.

214 LOCH Manual, Section 8.5.

215 While LOCH calls for the full amount of cash due with respect to market-maker and firm accounts, it calls for only 60 percent of the cash due with respect to customer accounts. The 40 percent that the clearing members keep compensates them for LOCH's not paying interest on cash. LOCH Manual, Section 3.4.

for value on the day after posting.[216] There appear to be no specific requirements as to how cash in U.S. dollars is to be posted. Where there is a margin credit, LOCH automatically prepares Town Clearing cheques.

Securities posted as margin may be withdrawn while in use if alternative collateral is substituted. In the special cases of U.K. government securities and CDs, the securities may be withdrawn early in the day with the expectation that they will be replaced by other obligations later in the day. Before the securities can be withdrawn in these cases, however, the investor must post a Town Clearing cheque for the amounts involved. If the investor does not deliver the substitute securities by a deadline for depositing Town Clearing cheques, LOCH will cash the cheques.

Exercise and Delivery

The following discussion applies specifically to the exercise of stock index options. The procedures for exercise of currency options are similar. (See the discussion of LIFFE currency futures for an indication of delivery procedures.)

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[216] The methods include a check drawn on a branch of a bank within the London French Franc Clearing System and whose correspondent bank in Paris is a member of the Sagittaire System, a wire transfer payment in London; a wire transfer in France (Virement Banque de France), a transfer on the books of LOCH's agent bank in Paris, Morgan Guaranty Trust, or a Protected Payments System arrangement wherein LOCH is authorized to debit a member's account. LOCH Manual, Section 8.4.3.

The delivery of the cash equivalent of the FT-SE 100 index consumes three business days.[217] The options may be exercised on any business day through a messenger's submitting to LOCH an exercise notice by 4:25 p.m. (6:00 p.m. on expiry day for all options series). The messenger must then wait and take a receipt as proof that the notice was delivered. On expiry day, all in-the-money FT-SE 100 option contracts are automatically exercised.[218]

Because of the way margins are calculated, the exercise notices must specify if the exercise is on behalf of a client, a market-maker, or the clearing firm's own account. Failure to enter this specification correctly could result in the option's not being exercised.

LOCH assigns exercise notices randomly to options writers. Assignments are made after each day's trades are processed and conceivably could compound any errors made in the delivery slips for the day's trades. In particular, if a trade has not been matched, a writer might be assigned on a short position that he had intended to be closed out or a holder may be unable to

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[217] Delivery times are not comparable to those for LIFFE options inasmuch as the underlying of a LIFFE options contract is a futures contract. They are, however, similar to delivery times for gilt futures.

[218] LOCH Manual, Section 4.4. The automatic exercise facility can be overridden manually. The deadline for override notices is 6:00 p.m. on expiry day. Automatic exercise does not apply to currency options.

exercise a position. Notice of assignments are available for collection by clearing members at 8:00 a.m. on the day following exercise or earlier if the members wish.

Delivery is made on the second day following exercise through normal funds transfer systems, e.g., Town Clearing cheques.

Exhibit I

Volume of Trading
(Number of Contracts)

Contract	1988	1987	1986	Date Started
Futures-LIFFE				
Eurodollar interest	1,647,507	1,732,835	1,104,002	9/30/82
Sterling interest	3,537,950	1,495,756	957,589	11/4/82
Short gilt	-0-	284	61,229	9/10/85
Medium gilt	54,108	--	--	1/7/88
Long gilt	5,586,753	6,977,907	2,612,721	11/18/82
U.S. Treasury bond	2,042,316	1,549,485	1,542,331	6/21/84
Yen bond	121,316	133,940	--	7/13/87
German bund	315,224	--	--	9/29/88
All currencies	16,593	31,942	71,909	Mostly 1982
FT-SE 100 index	465,103	458,045	121,608	5/3/84
Subtotal	13,787,184	12,380,194	6,471,389	
Options-LIFFE				
Eurodollar interest	76,191	41,982	38,455	6/27/85
Sterling interest	444,785	14,667	--	11/5/87
Long gilt	1,141,203	1,034,463	274,081	3/13/86
U.S. Treasury bond	84,378	54,415	51,790	3/13/86
Sterling/dollar	9,728	15,551	104,329	6/27/85
Dollar/mark	1,706	2,689	8,286	1/30/86
FT-SE 100 index	1,435	9,053	2,848	9/30/86
Subtotal	1,759,830	1,172,426	479,789	
Total-LIFFE	15,546,610	13,553,024	6,951,178	
Options-ISE/LTOM				
Gilts	17,329	60,993	48,000	1/10/85
Sterling/dollar	6,595	21,616	44,013	5/16/85
Deutschemark/dollar	228	548		6/20/85
FT-SE 100 index	1,175,192	883,637	411,784	5/3/84
Total-ISE/LTOM	1,199,344	966,734	503,797	

Sources: For LIFFE: International Financing Review, no. 757 (January 7, 1989), p. 83; LIFFE, Annual Review 1987. For ISE/LTOM: ISE; ISE, Quality of Markets Quarterly (Winter 1987/88); International Financing Review, no. 655 (January 10, 1987), p. 174; ICCH, Market Turnover Statistics 1986.

Exhibit II

The London International Financial Futures Exchange Limited
Consolidated Balance Sheet[1]
(Thousands of Pounds)

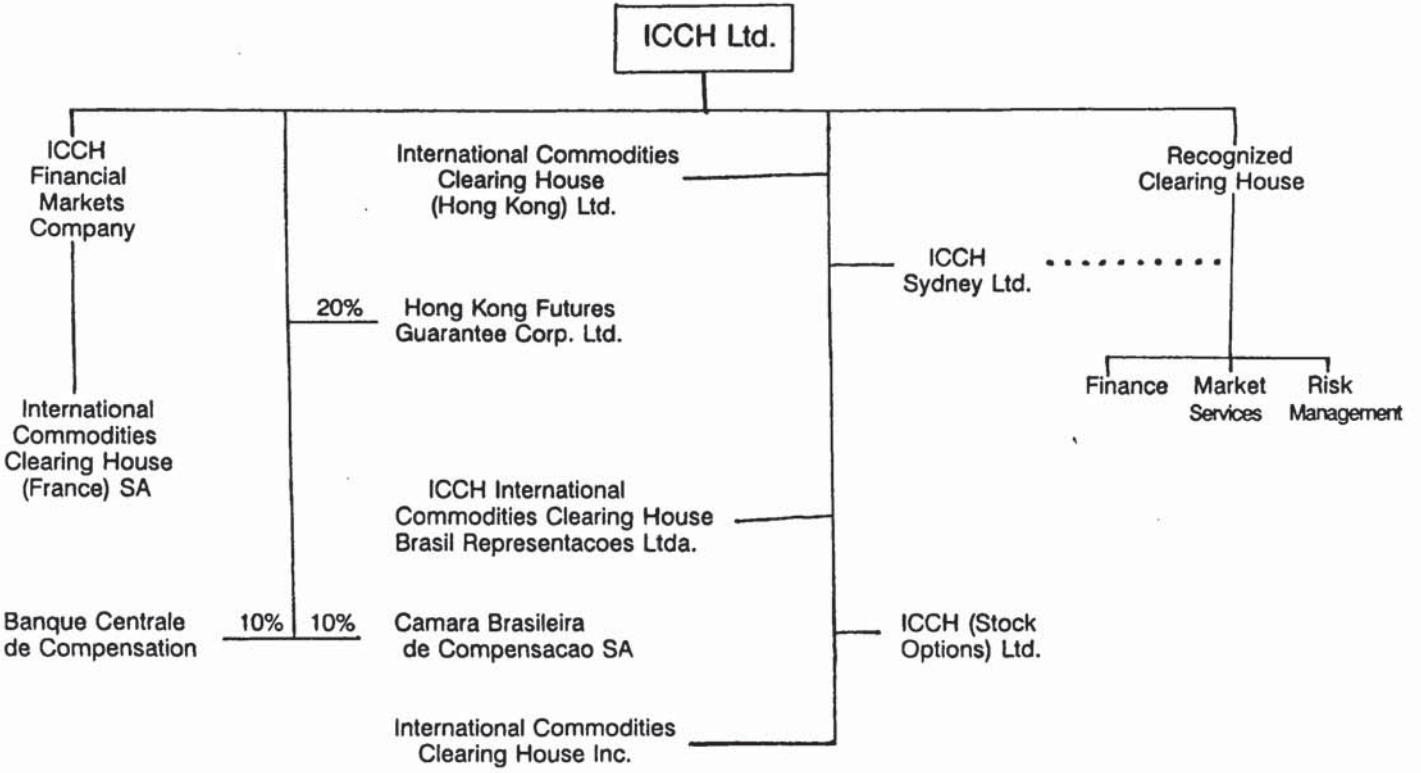
	12/31/87	12/31/86
Assets		
Cash and deposits	£ 6,028	£ 4,058
Accounts receivable	981	223
Prepayments and accrued income	566	464
Current assets	£ 7,575	£ 4,745
Fixed assets	4,412	3,809
Total assets	£11,987	£ 8,554
Liabilities and Capital		
Checks outstanding	£ 486	£ 499
Corporation taxes payable	587	124
Other payables	1,975	955
Accruals and deferred income	512	358
Current liabilities	£ 7,575	£ 1,936
Capital:		
Sale of seats on LIFFE	£ 9,060	£ 1,936
Sale of shares in LIFFE Options plc.	1,312	1,312
Deficit-LIFFE	(735)	(2,677)
Deficit-LIFFE Options plc.	(1,210)	(1,077)
Total capital	£ 8,427	£ 6,618
Total liabilities and capital	£11,987	£ 8,554

Source: LIFFE, Report and Accounts 1987.

[1] Reformatted according to American accounting terms and conventions.

Exhibit III

Organization of International Commodities Clearing House Ltd.



As of January 1989

Exhibit IV

International Commodities Clearing House Limited
Consolidated Balance Sheet[1]
(Thousands of Pounds)

Assets	10/31/87	10/31/86
Cash	£543,655	£252,165
Differences receivable on settlement of outstanding contracts	146,807	68,270
Other accounts receivable	24,560	27,915
Current assets	£715,022	£348,350
Equity in affiliated companies	2,227	1,553
Fixed assets	731	631
Total assets	£717,980	£350,534
Liabilities and Equity		
Bank loans and overdrafts	£ 8,197	£ 673
Customers' accounts	673,023	316,023
Other current liabilities	18,625	14,771
Current liabilities	£699,845	£331,467
Due affiliates	332	1,131
Deferred taxes	865	695
Long-term debt and other	129	261
Total liabilities	£701,171	£333,554
Reserves	1,809	1,980
Equity	15,000	15,000
Total liabilities and equity	£717,980	£350,534

Source: ICCH, Report & Accounts 1987.

[1] Reformatted according to American accounting terms and conventions.

Exhibit V-A

Interest-Rate Futures on LIFFE

	3-Month Sterling	3-Month Eurodollar	Short Gilt	Medium Gilt	Long Gilt
Unit of trading	£500,000	$1 million	£100,000	£50,000	£50,000
Trading hours	8:20 - 4:02	8:30 - 4:00	9:05 - 4:20	8:55 - 4:10	9:00 - 4:15
Delivery months	March, June, Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.
Delivery day	First business day after last trading day	First business day after last trading day	Any business day in delivery month	Any business day in delivery month	Any business day in delivery month
Last trading day	11:00 third Wednesay of delivery month	11:00 two business days prior to third Wednesday of delivery month	11:00 two business days prior to last business day in delivery month	11:00 two business days prior to last business day in delivery month	11:00 two business days prior to last business day in delivery month
Price quotation	100-interest rate	100-interest rate	Per £100 nominal	Per £100 nominal	Per £100 nominal
Minimum price movement (value)	1 basis point (£12.50)	1 basis point ($25)	£1/64 (£15.625)	£1/32 (£15.625)	£1/32 (£15.625)
Initial margin[a/] (straddle)	£500 (£100)	$500 ($150)	£1,000 (£125)	£750 (£125)	£1,000 (£125)

a/ New rates effective June 14, 1988.

Exhibit V-A (Cont'd)

	U.S. Treasury Bond	Japanese Government Bond	German Government Bond
Unit of trading	$100,000	¥100,000,000	DM 250,000
Trading hours	8:15 - 4:10	8:10 - 4:05	8:10 - 4:00
Delivery months	March, June Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.
Delivery day	Any business day in delivery month	First business day after last TSE JGB futures trading day	Tenth calendar day of delivery month (or the next following Frankfurt working day)
Last trading day	10:10 US CST (4:10 p.m. GMT) seven CBOT working days prior to last working day in delivery month	4:05 one business day prior to last TSE JGB futures trading day	11:00 Frankfurt time, three Frankfurt working days before delivery day
Price quotation	Per $100 nominal	Per ¥100 nominal	Per DM100 nominal
Minimum price movement (value)	$ 1/32 ($31.25)	.01 per ¥100 (¥10,000)	DM .01 (DM25)
Initial margin[a/] (straddle)	$2,000 (zero)	¥1,000,000 (¥250,000)	DM 2,500 (DM250)

[a/] New rates effective June 14, 1988.

Exhibit V-B

Interest Rate Options

	3-Month Sterling	3-Month Eurodollar	Long Gilt	U.S. Treasury Bond
Unit of trading	1 futures contract (£500,000)	1 futures contract ($1 million)	1 futures contract (£50,000)	1 futures contract ($100,000)
Trading hours	8:22 - 4:02	8:32 - 4:00	9:02 - 4:15	8:17 - 4:10
Expiry months	March, June, Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.
Expiry day	5:00 on last trading day	5:00 on last trading day	6:00 on last trading day	8:30 on last trading day
Exercise/delivery day	Exercise by 5:00 on any market day. Delivery on first business day after exercise.	Exercise by 5:00 on any market day. Delivery on first business day after exercise.	Exercise by 5:00 on any market day.[a/] Delivery on first business day after exercise.	Exercise by 5:00 on any market day.[b/] Delivery on first business day after exercise.
Last trading day	11:00 last trading day of underlying futures contract	11:00 last trading day of underlying futures contract	4:15 six market days before the first delivery day for the underlying futures contract	4:10 first Friday preceding by at least 6 CBOT working days the first delivery day for the underlying futures contract
Price quotation	100-interest rate	100-interest rate	Per £100 nominal	Per $100 nominal
Minimum price movement (value)	1 basis point (£12.50)	1 basis point ($25)	£1/64 (£7.8125)	$1/64 ($15.625)
Initial margin	See text	See text	See text	See text

a/ Extended to 6:00 p.m. on last trading day.

b/ Extended to 8:30 p.m. GST (2:30 p.m. Chicago time) on last trading day.

Exhibit VI-A

Currency Futures on LIFFE

	Sterling	Deutschmark	Dollar/Mark	Swiss Franc	Japanese Yen
Unit of trading	£25,000	DM 125,000	$50,000	SFr 125,000	¥12,500,000
Trading hours	8:32 - 4:02	8:34 - 4:04	8:34 - 4:04	8:36 - 4:06	8:30 - 4:00
Delivery months	March, June, Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.	March, June, Sept., Dec.
Delivery day	Third Wednesday of delivery month	Third Wednesday of delivery month	Third Wednesday of delivery month	Third Wednesday of delivery month	Third Wednesday of delivery month
Last trading day	10:31 on second business day prior to delivery	10:32 on second business day prior to delivery	10:32 on second business day prior to delivery	10:33 on second business day prior to delivery	10:30 on second business day prior to delivery
Price quotation	$ per £	$ per DM	DM per $	$ per SFr	$ per 100 Yen
Minimum price movement (value)	.01¢/£ ($2.50)	.01¢/DM ($12.50)	DM .0001/$ (DM5.00)	.01¢/SFr ($12.50)	.01¢/100 Yen ($12.50)
Initial margin (straddle)	$750 ($100)	$1,000 ($100)	DM1,250 (DM100)	$1,000 ($100)	$1,000 ($100)

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a/ New rates effective June 14, 1988.

Exhibit VI-B

Currency Options

	LIFFE Sterling	LIFFE Dollar/Mark	LITOM Sterling	LITOM Deutschmark
Unit of trading	£25,000	$50,000	£12,500	DM62,500
Trading hours	8:34 - 4:02	8:36 - 4:04	9:00 - 4:05	9:00 - 4:05
Expiry months	March, June, Sept., Dec. with three nearby months	March, June, Sept., Dec. with three nearby months	March, June, Sept., Dec. with three nearby months	March, June, Sept., Dec. with three nearby months
Expiry day	5:00 on last trading day	10:00 two business days before third Wednesday of expiry month	6:00 on last trading day	6:00 on last trading day
Exercise/delivery day	Exercise by 5:00 on any market day. Delivery on third business day after exercise.	Exercise by 5:00 on any market day (10:00 a.m. on expiry day). Delivery on third business day after exercise (second business day after exercise on expiry day).	Exercise by 5:00 on any market day (6:00 on expiry day). Delivery on third business day after exercise.	Exercise by 5:00 on any market day (6:00 on expiry day). Delivery on third business day after exercise.
Last trading day	4:02 three business days before third Wednesday of expiry month.	4:04 three business days before third Wednesday of expiry month.	3:40 on Friday before third Wednesday of expiry month.	3:40 on Friday before third Wednesday of expiry month.
Price quotation	U.S. cents/£	pfennig/$	U.S. cents/£	U.S. cents/DM
Minimum price movement (value)	.01¢/£ ($2.50)	.01 pfennig/$ (DM5.00)	.05¢/£ ($6.25)	.01¢/DM ($6.25)
Initial margin	See text	See text	8% of value of contract plus or minus in or out-of-money element.a/	8% of value of contract plus or minus in or out-of-money element.a/

a/ Subject to a minimum of $250.

Exhibit VII

STOCK-INDEX INSTRUMENTS

	LIFFE FT-SE 100 Futures	LTOM FT-SE 100 Options
Unit of trading	£25 times index	10 times index
Trading hours	9:05 - 4:05	9:05 - 4:05
Delivery/expiry months	March, June, Sept., Dec.	Nearest four months
Expiry day	Not applicable	Last trading day
Exercise/delivery day	Delivery on first business day after last trading day.	Exercise by 4:25 on any market day. Delivery on second business day following exercise.
Last trading day	11:20 on last business day in delivery month.	11:20 a.m. on last business day in expiry month.
Price quotation	Index/10	Pence/(pence X index)
Minimum price movement (value)	.05 (£12.50)	.5 pence (£5.00)
Initial margin (straddle)	£2,500[1] (£125)	12.5% of market value plus or minus in or out-of money element.[2]

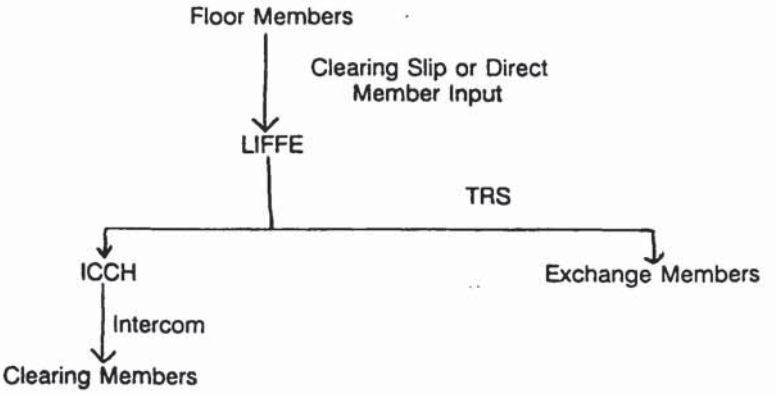
[1] Effective June 14, 1988.

[2] Subject to a minimum of 3% of market value.

Exhibit VIII

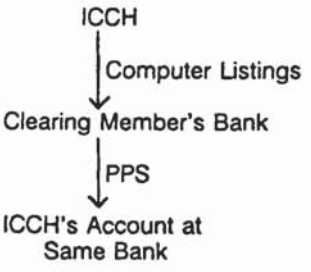
LIFFE-ICCH
Clearing Sequence

Day of Trade



Day after Trade

Posting Margin



Recalling Excess Funds

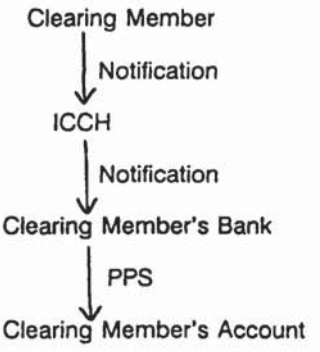


Exhibit IX

Banks in the Protected Payments System

Sterling and U.S. Dollars
Domestic Banks
- Bank of England*
- Bank of Scotland
- Barclays Bank
- Central Trustee Savings Bank*
- Coutts & Co.
- Lloyds Bank
- Midland Bank
- National Westminster Bank
- Royal Bank of Scotland
- Standard Chartered Bank

Foreign Banks
- Bank of Montreal
- Bankers Trust Company
- Chase Manhattan Bank
- Chemical Bank
- Citibank NA
- First National Bank of Chicago
- Irving Trust Company
- Morgan Guaranty Trust Co.
- Northern Trust Company

Deutsche Marks
- Deutsche Bank AG

Yen
Japanese Banks
- Bank of Tokyo
- Dai Ichi Kango Bank
- Fuji Bank
- Mitsubishi Bank
- Mitsui Bank
- Mitsui Trust & Banking Co.
- Sanwa Bank
- Sumitomo Bank

Other Banks
- Barclays Bank
- Citibank
- First National Bank of Chicago
- Midland Bank
- Royal Bank of Scotland

* Sterling only

Exhibit X

Mandate to ICCH for Operation of the Protected Payments System

TO: The Manager

..... (PLEASE ENTER

..... NAME AND

..... ADDRESS OF

..... BANK

ICCH LIMITED

I/We authorise you, until further notice in writing, to debit my/our account with unspecified amounts from time to time at the instance of ICCH Limited without further reference to me/us.

In acting on this Mandate, you may rely, without qualification, upon the information provided to you by ICCH Limited in whatsoever form this information is submitted to you.

|_| £ |_| $ |_| DM |_| YEN

For and on behalf of:

.....

.....

(signed)

When completed and signed, this form should be sent to:-

Treasury Department
International Commodities Clearing House Limited
Roman Wall House
1-2 Crutched Friars
London
EC3N 2AN

Exhibit XI

Delivery in U.S. Treasury Bond Futures Contract

	Chicago Time	New York Time	London Time	Sydney Time[1]
Position Day[2]				
Gross position statement	1:00 p.m.	2:00 p.m.	7:00 p.m.*	6:00 a.m.
EDSP announced	2:30 p.m.	3:30 p.m.	8:30 p.m.	7:30 a.m.
Seller's Delivery Notice	8:00 p.m.*	9:00 p.m.	2:00 a.m.	1:00 p.m.
Notice of Intention Day[3]				
Allocation to buyers	2:15 a.m.	3:15 a.m.	8:10 a.m.	7:15 p.m.
Seller's Nomination Notice	2:00 p.m.*	3:00 p.m.	8:00 p.m.	7:00 a.m.
Buyer's Delivery Details	2:00 p.m.*	3:00 p.m.	8:00 p.m.	7:00 a.m.
Counterparty informed	2:45 p.m.*	3:45 p.m.	8:45 p.m.	7:45 a.m.
Delivery Day				
Buyers instruct banks to accept delivery	8:30 a.m.*	9:30 a.m.	2:30 a.m.	1:30 a.m.
Delivery from seller to ICCH	10:30 a.m.*	11:00 a.m.	4:00 p.m.	3:00 a.m.
Delivery from ICCH to buyer	1:00 p.m.*	2:00 p.m.	7:00 p.m.	6:00 a.m.

* Controlling time zone

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[1] Except for the allocation to buyers, these times are for the calendar day following that in Chicago and New York. Assumes Chicago, New York and London are on standard time. (From May thru October, the times in Sydney would be two hours earlier than shown.)

[2] Formerly called "Notice Day"

[3] Formerly called "Intention Day"

Exhibit XII

Sample Undertaking - For Delivery of Dollars

To: Telex Number 887716/SWIFT
ADDRESS FNBC GB2L
Attention: Customer Service - ICCH Co-ordinator
THE FIRST NATIONAL BANK OF CHICAGO - LONDON BRANCH

Re: ICCH/(Insert name of Seller or Buyer)

We hereby unconditionally, irrevocably and without deduction or defence based upon set-off or counterclaim of any kind promise to pay on or before 10.00 a.m., New York time, in same-day funds to First Chicago International, New York Branch ("FCINY") for the account of The First National Bank of Chicago - London Branch, favour the International Commodities Clearing House Limited, the principal sum of
[ ] United States Dollars (U.S.$[ ]),
on the [ ] day of [ ], 19 .

We shall effect payment of the said amount by the method indicated below:

(*Insert one of the following instructions set out below)

This Undertaking may be cancelled only upon notice given by The First National Bank of Chicago ("FNBC").

This Undertaking is a separate and independent stipulation and may be enforced without FNBC having to take any steps or initiate any proceedings against our customer.

This Undertaking shall be governed by English Law.

BANK

* Instructions

[(i) We will transfer Federal Funds to FCINY on or before 10.00 a.m. New York time on the date and in the amount indicated above.]

[(ii) We will transfer same-day funds, via CHIPS to FCINY on or before 10.00 a.m. New York time on the date and in the amount indicated above.]

[(iii) We irrevocably authorise and instruct The First National Bank of Chicago, London to charge our Account No. _____ in the amount and on the date stated above.]

Exhibit XIII-A

LIFFE Traded Options Margin Report

PAGE 1

MEMBER AAA A LIFFE MEMBER & CO

COMMODITY EURODOLLAR OPTION

JUN 85	STRIKE PRICE	CALL/ PUT	LONG	SHORT	UNCOVERED LOTS	RISK FACTOR	RISK AMOUNT	SHORT LOTS FOR ADDITIONAL MARGIN	SHORT LOTS RATE	SHORT LOTS AMOUNT
	90.50	CALL	41	36	+5	+0.730	+3.65			
	91.00	CALL	10	0	+10	+0.520	+5.20			
	90.50	PUT	0	19	-19	-0.270	+5.13	19	125	2,375.00
	91.00	PUT	3	2	+1	-0.480	-0.48			
TOTAL OPTIONS							+13.50			2,375.00
TOTAL FUTURES			0	10	-10		-10.00			

SEP 85	STRIKE PRICE	CALL/ PUT	LONG	SHORT	UNCOVERED LOTS	RISK FACTOR	RISK AMOUNT	SHORT LOTS FOR ADDITIONAL MARGIN	SHORT LOTS RATE	SHORT LOTS AMOUNT
	90.50	CALL	0	7	-7	+0.450	-3.15	7	225	1,575.00
	90.50	PUT	5	2	+3	-0.550	-1.65			
TOTAL OPTIONS							-4.80			1,575.00
TOTAL FUTURES			0	5	-5		-5.00			

Source: ICCH

Exhibit XIII-B

LIFFE Traded Options Margin Report

MEMBER AAA A LIFFE MEMBER & CO

PAGE 2

COMMODITY EURODOLLAR OPTION

DELIVERY MONTH	OPTION RISK AMOUNT	FUTURE LOTS	FUTURE/OPTION SPREAD AMOUNT	FULL RATE FUTURE/OPTION AMOUNT ---LONG	FULL RATE FUTURE/OPTION AMOUNT ---SHORT---	SHORT OPTION LOTS VALUE
JUN 85	+13.50	10.00	10.00	+3.50	0	2,375.00
SEP 85	-4.80	-5.00	0	0	-9.80	1,575.00
COMMODITY TOTALS FOR MARGIN			(A) 10.00	(B) +3.50	(C) -9.80	(D) 3,950.00

INITIAL MARGIN CALCULATION:	AMOUNT	RATE (US $)	INITIAL MARGIN (US $)
A INTRA-MONTH SPREAD MARGIN	10.00	25	250.00
B INTER-MONTH SPREAD MARGIN	3.50	50	175.00
C FULL RATE INITIAL MARGIN	6.30	1000	6,300.00
D SHORT OPTION ADDITIONAL MARGIN			3,950.00
E SHORT OPTION ADDBACK			0.00
F LONG OPTION ADDBACK			0.00
TOTAL		US $	10,675.00

Source: ICCH

Exhibit XIV

Banks Authorized to Hold Securities and Issue Guarantees on Behalf of LOCH

Arbuthnot Latham & Co Ltd
Australia & New Zealand Banking Group Ltd
Bank of America
Banque Indosuez
Bank of England
Bank of Montreal
Bank of New York
Bank of Scotland
Bank of Tokyo
Banque Nationale de Paris
Banque Paribas
Barclays, Paris
Barclays Bank PLC
Baring Brothers & Co Ltd
Brown Shipley & Co Ltd
CCF
Charterhouse Japhet PLC
The Chase Manhattan Bank N.A.
Chase Manhattan Bank
Citibank N.A.
Clydesdale Bank Ltd
Coutts & Company
Credit Lyonnais
Credit Suisse London Ltd
EBC Amro Bank Ltd
Guiness Mahon & Co Ltd
Gulf International Bank
Hambros Bank Ltd
Hill Samuel & Co Ltd
Hong Kong and Shanghai Banking Corporation
Irving Trust Company
Kleinwort Benson Ltd
Lazard Brothers & Co Ltd
Lloyds Bank PLC
Midland Bank PLC
Morgan Grenfell & Co Ltd
Morgan Guaranty Trust Company of New York
Morgan Guaranty
1st National Bank of Chicago
Natwest Investment Bank Ltd
National Westminster Bank PLC
Rea Brothers plc
Robert Fleming
Rothschild (N.M.) & Sons Ltd
Royal Bank of Canada
Royal Bank of Scotland plc (The)
S.G. Warburg & Co Ltd
Samuel Montagu & Co Ltd
Schroder (J. Henry) Wagg & Co Ltd
Security Pacific National Bank
Singer & Friedland
Standard Chartered Bank
Societe Generale
Swiss Bank Corporation
Union Bank of Switzerland
Union Discount Company Ltd
United Bank of Kuwait
LOCH Nominees Ltd

For the purposes of CDs only:
the following building societies
are also acceptable:

Abbey National
Alliance and Leicester
Halifax
Nationwide Anglia
Permanent
Woolwich Gateway

In addition these banks maybe used
used for CDs:

Sumitomo Bank
Mitsubishi Bank

Note: Valid pledge forms will be accepted from any nominee company or any wholly owned trust company of any of the banks on the above list.

Exhibit XV

Example of a Bank Guarantee to LOCH

FROM: BANK NAME
ADDRESS

TO: THE LONDON OPTION CLEARING HOUSE LIMITED

In consideration of your accepting this Guarantee in satisfaction of the obligation of ..... ('the Clearing Agent') under the Rules and Regulations and Permanent Notice of The Stock Exchange for the time being in force to deposit with you margin in respect of transactions in London Traded Options ('Options') in the sum of £..... (..... pounds) we ..... Bank Plc hereby guarantee that in the event of the non-payment by the Clearing Agent of any monies for the time being and from time to time owing by the Clearing Agent pursuant to such Rules, Regulations and Permanent Notices to you (whether on account of margins, differences or otherwise howsoever) in respect of transactions in Options we will upon written demand (notice of default) received from you pay to you such sum or sums as may from time to time be specified in the notice of default provided always that our total liability hereunder shall not exceed the sum of £..... (..... pounds).
A notice of default shall as between you and us be conclusive evidence that our liability hereunder has accrued in the sum claimed from us therein provided it be signed by two of your Directors whose signatures shall be duly authenticated by your Bankers. This Guarantee shall remain in force until determined by our giving you notice in writing to that effect after which determination of our liability hereunder will be restricted to transactions entered into by the Clearing Agent before receipt by you of such notice.

IN WITNESS whereof the Common Seal of ..... NAME OF BANK ..... was hereunto affixed this ..... DATE .....

The Common Seal of
NAME OF BANK
was hereunto affixed in the
presence of:

Authorised Sealing Officer
Date .....

Clearing and Settling the Euro-Securities Market
Euro-Clear and Cedel